Traffic Quarterly

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An Editorial

THE purpose of a new road is not always to relieve traffic. A new road frequently is needed for greater and safer travel. Each delay in providing that improved travel greatly increases its need. Yet when we think of long-range, large-sum programs of road building, we should keep our thinking straight.

We have two inseparable components of motor travel today: movement on the highway, and *parking*. They create two problems different enough not to be easily confused.

For each problem, the justification for needed improvements is basically different. But the determined effort to solve *both* problems should be comparable. Both problems are closely interrelated. Therefore overemphasis on one of them may aggravate the other.

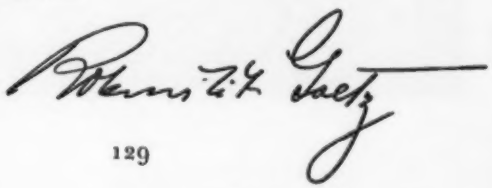
Two exasperating and invariable experiences of motor travel are dangerous driving and no place to park.

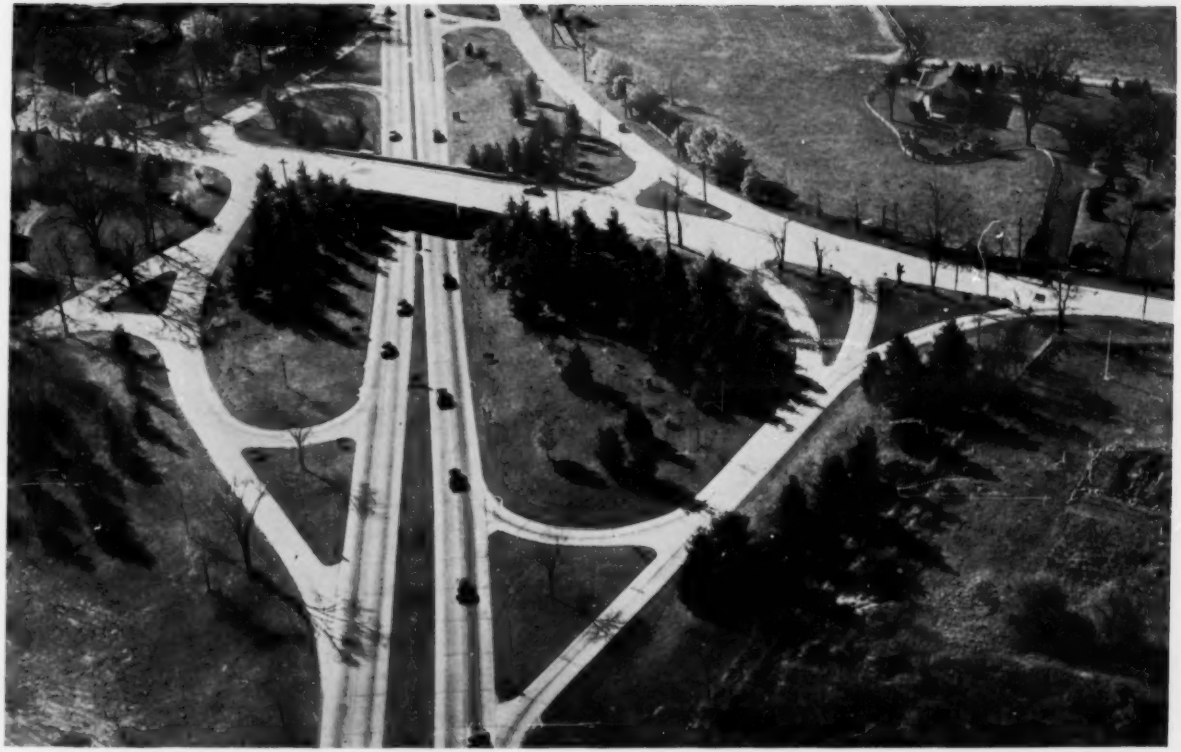
Unfortunately, new highways do not eliminate bad driver attitudes. Nor do they furnish parking facilities. Without a new basis of concern for all driver-offenses, the driver's respect for legal traffic regulation will in time all but vanish.

Without a bold change in our judicial attitude toward all violators of all offenses, efficient enforcement of traffic regulation will continue to grow steadily more difficult.

Without greater harmony between traffic courts and enforcement agencies toward a single purpose, we may expect to lose much support from the law-abiding motorist whose understanding and driving attitude are an important contribution to safe driving.

Without concerted uniform action initiated by higher-ups, you cannot expect the individual driver on the highway to appreciably improve our present driving pattern. Nor can you expect the individual citizen to correct the ever-present mainstreet blockade on through routes. Those far-reaching and important measures must originate at the highest levels.





Traffic interchange at the junction of New York's Hutchinson River Parkway and Connecticut's Merritt Parkway (foreground) in the town of Greenwich. King Street, New York overpasses the parkways at this point.

This bridge carries the Derby–Milford Road over the Wilbur Cross Parkway south of Conn. 34.

Connecticut's Two Parkways

G. ALBERT HILL

Dr. Hill, president of the Connecticut State Highway Safety Association since 1941, has been Connecticut State Highway Commissioner since 1948. Formerly an instructor in chemistry at Harvard, later professor of chemistry at Wesleyan University, Connecticut, he is a member of the Northeast Association of Chemistry Teachers, a member of the American Association of Highway Officials and a recipient of the President's Certificate of Merit.

CONNECTICUT'S two major parkways are excellent examples of the utility and safety that distinguishes dual-lane limited access highways. The territory through which these two routes pass is urban in some sections, rural in others, thus providing a comprehensive test.

Forty-seven million motor cars have traveled the Merritt Parkway through Greenwich in the ten years between June, 1939, and June, 1949, Traversing all or part of this parkway these vehicles and their operators have amassed a safe-driving record that stands with the best for high-speed highways or, in fact, any highways.

Accident statistics have been analyzed for the years 1938 to 1948, inclusive, for the 38-mile Merritt Parkway and for the somewhat shorter period during which the first five miles of the Wilbur Cross Parkway were in use between Milford and Route 34 in Orange.

In the period covered a total of 3238 accidents occurred on the combined 43 miles of parkway while fatalities numbered only forty-seven. The importance of parkway safety features is illustrated by the fact that the accident rate is 206 and the fatality rate 3.0 for each 100 million vehicle miles. The overall state highway rates are 325 accidents and 6.0 fatalities. This is further emphasized when it is realized that the general Connecticut rates used are already among the best in the country for general highways.

Safety and Utility

Comparably good accident experience has developed for the entire Wilbur Cross Parkway which furnished like facilities—limited access, divided highway—from Milford to Meriden.

World War II intervened in the construction of the Wilbur Cross Parkway which was usable only between Milford and Orange during the war years. This is the section included in the rates just cited. The progressive completion of the remaining sections since 1945 has prevented the compilation of a long-term record similar to that of the first-opened portion of the route.

However, some indication of the validity of the safe record of the Cross Parkway is given by the traffic total at Milford. The nine years ending August 1949 saw almost 27 million vehicles on the parkway in that town. It should not be taken from these figures that the Cross Parkway at Milford carries only about half the volume of traffic that passes through Greenwich on the other facility. While this was true in the first few years of operation, the 1948–1949 fiscal year tells another story. With traffic exceeding five million cars that year the Cross Parkway carried a volume that approached 70 per cent of that of the older facility.

These two parkways, like many other soundly engineered, similar routes in other parts of the country have demonstrated their safety and utility. There remains then the question of how much this convenience and safety cost.

How much did they cost to build, how much now to maintain?

Initial statutory recognition for the Merritt Parkway was given in 1927. This was followed by further enactments dealing only with the layout of the projected road and it was not until 1935 that Legislative recognition was given the needs for special financing of the parkway.

Recognizing that the Highway Fund could not provide the money at a sufficiently rapid pace the General Assembly authorized Fairfield County to borrow an aggregate of $15,000,000. The same statute provided that the payments on principal and interest of this bond issue be provided out of the Highway Fund (the principal income of the State Highway Department). In the same law the state

View to the north along the Wilbur Cross Parkway east of the Housatonic River in the town of Orange.

Traffic interchange at the Wilbur Cross Parkway and Conn. 34 (Derby Avenue) just west of New Haven. Conn. 34 overpasses the parkway at this location.

highway commissioner was directed to proceed with the construction of the parkway.

This construction work was carried out and while the parkway was opened for its entire length in September of 1940, additional capital expenditures were made on grade separations and other items after that date. The final capital report on the Merritt Parkway as of December 31, 1943 showed the total cost to be $21,225,334.64. Of this sum $14,641,673 came from the proceeds of the bond issue. The remaining amount $6,538,661.64 came almost entirely from the Highway Fund but did comprise a PWA grant which was made at a time when the PWA was searching for projects upon which to place unemployed workers.

The Toll Statute

As the Merritt Parkway approached completion it became increasingly evident that there existed need for further parkway facilities east of the Housatonic River and extending generally in the direction of the center of the State. Consideration of means of financing such a parkway extension further showed that the Highway Fund, being already charged with the retirement of the Merritt Parkway bond issue, could not undertake the full task of parkway extension.

This situation appealed to the General Assembly and in 1939 a statute was enacted establishing the toll stations at Greenwich on the Merritt Parkway and at Milford on the then authorized Wilbur Cross Parkway. The statute provided that proceeds from these toll stations together with 5 per cent of the motor vehicle revenues assigned to the highway fund would be pooled in a fund to be known as the Wilbur Cross Parkway Fund.

Subsequent enactments abolished the allocation of the 5 per cent item, limiting the Wilbur Cross Parkway Fund to the income from the parkway tolls. Provision was contained in the original toll statute for a small bond issue if at any time during the construction of the Wilbur Cross Parkway needs might outstrip the then available toll proceeds. A still later enactment increased the bond authorization. Altogether bonds have provided $6,800,000 for construction.

It should be noted in this connection that at no time have the maintenance costs of either parkway been chargeable to toll income. Instead these expenses are borne out of the regular Highway Fund. The toll income is allocated, after cost of administration, for the sole purpose of providing the extension of the parkway system.

The toll statute authorizes the establishment of additional toll stations on the Wilbur Cross Parkway provided at the point where tolls are charged there exists an alternative free route. Under the statute the tolls expire automatically at such time as all work is completed and all obligations therefore, including bonds, are discharged.

As this is written the Wilbur Cross Parkway is open from the Housatonic River to a northern terminus at a junction with Route U.S. 5 near the north city line of Meriden. There remains some work to be performed on the newer sections and it is estimated that with the completion of this the cost will be somewhat above the seventeen and one half million dollars. It is difficult to make comparisons between the two parkways insofar as costs are concerned because all of the Merritt Parkway work was performed prior to World War II while the bulk of the work on the Wilbur Cross Parkway was undertaken after the end of World War II and consequently reflects much higher construction costs.

There remains, however, a number of items upon which comparisons may be made. There are sixty bridges separating the Merritt Parkway from intersecting roads in the thirty-eight miles traversed by that facility. The Wilbur Cross Parkway record is thirty-eight bridges for a twenty-nine mile length.

The Merritt Parkway provides two twenty-six-foot concrete traffic lanes separated by a twenty-two-foot landscaped median strip. Each of the traffic lanes is bordered on the inside and outside with a rounded concrete curb. On the Wilbur Cross Parkway the concrete travel lanes are only twenty-four feet wide and are separated by a twenty-foot landscaped median strip. However this slight decrease in the travel lane width is more than offset by the existence of stabilized shoulders on the outer edges of the traffic lanes. This tends to increase the usable travel lane and to obviate difficulties caused by parking in the travel way. With no outside curb there is no temptation to avoid driving to the shoulder when halting a vehicle.

This bridge carries East Rock Road over the Merritt Parkway in the town of Norwalk.

The undulating Merritt Parkway stretches toward New York in this view in the town of Stamford.

Merritt Maintenance Costs

Because of variables—divided highway versus ordinary two-lane road, degree of elaboration in roadside development and weather differences—it is not possible to make reasonable comparisons of maintenance costs on the parkways and on other roads.

It is possible, however, to tell what parkway maintenance costs have been in recent years. The 38-mile Merritt Parkway cost for all forms of maintenance a total of $166,685 in the 1947–1948 fiscal year and $253,314 in the 1948–1949 year. The maintenance operations covered by these sums include roadway and roadside costs as well as snow removal and ice control.

The Connecticut state highway system, while one of the best, has pressing needs for improvement that far exceed its prospective income for several years to come.

This situation has caused renewed consideration of the terms of the law permitting the establishment of additional toll stations to provide funds for extension of the Wilbur Cross Parkway. While decision has not been reached, there seems to be considerable merit in the proposal. This is especially true if the state highway program is limited to its present rate of development for any considerable period. Prospective toll payers might, under such conditions, prefer the needed road with a toll, to the mounting congestion that besets present routes in the areas concerned.

One-way Routings in Smaller Cities[1]

F. B. CRANDALL

Mr. Crandall is Traffic Engineer for the Oregon State Highway Department. He is in charge of Traffic Control and Planning Survey operations. He has written or co-authored technical reports and bulletins published by the Oregon department. He is a member of the Institute of Traffic Engineers, of the Highway Research Board, and of American Association of State Highway Officials.

WITH FINE reference material on one-way streets available, it is not necessary to set down an exhaustive enumeration of basic and inherent traffic betterments that accrue from one-way street operation. It is sufficient to say that, properly applied, one-way traffic on a particular street or highway increases traffic capacity and minimizes conflict. One-way street treatment has been increasingly applied in metropolitan areas, and here again, good reference material is available.

This article confines itself to the use of the one-way street couplet as a means of more adequately handling highway traffic through smaller urban population centers, particularly as such treatment has found application in Oregon.

Range of Highway Administrative Problems

First, consider in broad perspective the problems a highway administrator confronts in a state such as Oregon compared with those confronting the operating engineer in more densely populated states on the eastern seaboard. In highway administrative work in metropolitan states, the principal attention will probably be devoted to the metropolitan areas as a logical scheme of priority. In Oregon and states of comparable economy and circumstance, the population to be served is distributed in a different pattern. It tends to be widely dispersed in small population centers over a relatively large mileage, and the Oregon Highway Commission is responsible for the entire

[1] The phrase *smaller cities* is used in a purely relative sense, population-wise.

highway network including urban extensions. These diverse circumstances may clarify our situation for those who otherwise might ask, "Since small cities have no acute traffic problem, why should they receive so much consideration at the expense of larger metropolitan areas that really have a problem?"

The Portland metropolitan area is not (in the writer's mind, at least) the self-contained economic unit that large cities elsewhere constitute. The economic life of the Portland metropolitan area is closely related to that of the hinterlands of the state. In carrying out a balanced program in Oregon, highway administrators must, and do, fairly allocate time and consideration to small population centers.

The population of Portland is estimated at 433,000. From this level there is a drop to 57,000 in Salem, the capital city; 40,000 in Eugene; and dropping down by population groups, seven other cities exceed 10,000 population; nine cities fall in the 5,000 to 10,000 group; eighteen in the 2500 to 5000 group; and one hundred sixty-nine corporate cities and towns have less than 2500 population. Some 7200 miles of state highway system serve these municipalities directly or indirectly. The 7200-mile system experiences annually some three and one-half billion vehicle miles.

Economics of the Problem

In the treatment of any traffic problem, it is often possible to show a "paper profit" for motorists in terms of benefits, and conversely to point up the fact that motorists "pay for highway facilities they do not have." With no intention to belittle the need for advance planning and for amassing evidence to promote needed revenues for highway purposes, the operating engineer must treat of the moment. Of necessity, he must lower his sights in devising a plan of treatment compatible with budgetary limitations. Over and above money limitations, it often happens, in the instance of smaller population centers, that quantitative values of traffic do not warrant an outlay of funds such as accrue to expensive grade separations, traffic interchanges, depressed ways, elevated ways, street widenings, and by-pass routes.

To cite a hypothetical situation exemplary of actual cases con-

fronted, assume a small urban population center, traversed by a primary highway route. With respect to these two elements, and traffic-wise, there will be two general categories of traffic: through-traffic and local generation. Assume on the highway route at the fringes of this urban area a traffic volume of 3000 vehicles a day, with a peak of 5000 a day within the city proper. Assume, with respect to the 3000 value, and in terms of the two aforementioned categories with respect to origin and destination, that this total pool of 3000 splits 50–50.

It is improbable that a by-pass route to handle the 1500 increment can, from a solvency or benefit standpoint, be justified. Turning to possiblity of a facility for common use of both through and local traffic there may be found a lack of warrant for anything in the way of depressed or elevated facility. Nor is there warrant or money to provide boulevard-type facility with incident high right-of-way costs. In such a situation, the development of a one-way street couplet for the highway routing has offered a solution possible of realization from a money standpoint and, on the basis of experience had to date, one that gives maximum return for dollar expended.

HIGHWAY US99W THROUGH CITY OF CORVALLIS

COMPARATIVE DATA BEFORE AND AFTER INSTALLATION OF ONE-WAY STREET COUPLET

Population: 8,392 Year: 1940

Date One-Way Couplet Installed: August 24, 1949

Cost of Improvement—Inclusive of rights of way and construction costs: $186,000[3]

"Before" Period: September 1, 1948 to November 30, 1948

"After" Period: September 1, 1949 to November 30, 1949

Item	*Before*	*After*
Length of Highway Section—Miles	1.26	1.26[1]
Number of Moving Lanes on Highway Route	2	4
Type of Parking	Angle and Parallel	Parallel
Average Daily Traffic	7,172	8,880
Annual Vehicle Miles	3,167,737	3,922,087
Number of Accidents	36	32
Accident Rate—Acc./Mill. Veh. Miles	[2]	[2]
Travel Time—Minutes	4.00	[2]
Signals	0	0

[1] Total miles in couplet divided by 2.

[2] Recent installation—study incomplete.

[3] Construction project includes cost of a 406-foot reinforced concrete bridge.

Highway US 99W Through City of Corvallis

Highway US 30 Through City of Pendleton

The use of the one-way street couplet under circumstances of application in Oregon should not necessarily be considered as a stop-gap proposition. On the contrary, it may be viewed in the majority of cases as a "final" treatment and one providing an unused capacity margin that will satisfy the traffic needs for some years to come. The wide median boulevard-type of facility no doubt has far greater eye-appeal for the layman motorist. Traffic-wise, however, it has shown weaknesses not encountered in the one-way couplet facility.

Notable in this connection is the problem of left-turn movement —with the one-way treatment the interconnecting cross streets supplant the left-turn refuges found in the boulevard-type facility eliminating the left turn conflict and forestalling any need for three-phase signal operation. Traffic engineers are fully cognizant of the capacity-depreciating effect of the left-turn conflicts and complications injected in any consideration of progressive signal timing by reason of such conflicts.

Exemplary Projects

Orientation photographs and companion tabulations show before-and-after experience with respect to five cities in Oregon wherein

HIGHWAY US30 THROUGH CITY OF PENDLETON

COMPARATIVE DATA BEFORE AND AFTER INSTALLATION OF ONE-WAY STREET COUPLET

Population: 8,847 Year: 1940

Date One-Way Couplet Installed: September 9, 1948
Cost of Improvement – Inclusive of rights of way and construction costs: $120,000
"Before" Period: September 1, 1947 to August 31, 1948
"After" Period: October 1, 1948 to September 30, 1949

Item	*Before*	*After*
Length of Highway Section—Miles	1.0852	1.1563[1]
Number of Moving Lanes on Highway Route	2	4
Type of Parking	Angle and Parallel	Angle and Parallel
Average Daily Traffic	9,374	9,724
Annual Vehicle Miles	2,712,900	4,104,000
Number of Accidents	141	132
Accident Rate—Acc./Mill. Veh. Miles	37.9	32.2
Travel Time—Minutes	3.75	3.20
Signals	0	2

[1] Total miles in couplet divided by 2.

the one-way street couplet has been used as a treatment for the highway routing. The exhibit is self-explanatory; little comment is necessary. Sufficient experience has established the method as sound. Before-and-after comparative data merely give quantitative values that may combine with information of similar nature from other localities and add to the store of evidence needed in public relations work to convince local citizenry and motorists in general of the efficacy.

Public Reaction

With regard to public relations and the reaction of motorists and local people to this type of treatment, some strong opposition and misgivings were expressed on initial and earlier projects. As time has elapsed and local people have become educated and accustomed to the one-way streets, opposition has progressively decreased to the extent that in the instance of some of the more recent installations, request for a survey looking to possible one-way treatment has had its impetus from the local citizenry rather than the highway department. Many local people, particularly business men, initially some-

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HIGHWAY US99 THROUGH CITY OF EUGENE
COMPARATIVE DATA BEFORE AND AFTER
INSTALLATION OF ONE-WAY STREET COUPLET

Population: 20,838 Year: 1940

Date One-Way Couplet Installed: February 2, 1942
Cost of Improvement—Inclusive of rights of way and construction costs: $110,000
"Before" Period: January 1, 1941 to December 31, 1941
"After" Period: January 1, 1943 to December 31, 1943

Item	*Before*	*After*
Length of Highway Section—Miles	1.8628	1.8628[1]
Number of Moving Lanes on Highway Route	2	4
Type of Parking	Parallel	Parallel
Average Daily Traffic	8,204	6,042
Annual Vehicle Miles	5,578,500	4,108,700
Number of Accidents	408	153
Accident Rate—Acc./Mill. Veh. Miles	73.14	37.48
Travel Time—Minutes	8.06	6.54
Signals	5	2

[1] Total miles in couplet divided by 2.

Highway US 99 Through Eugene

Highway US 99 Through Medford

what dubious, have subsequently realized that their misgivings were more fancied than real. In many instances, and contrary to expectations, greater traffic mobility has resulted in the downtown area, making the shopping tour a more inviting prospect for potential patrons.

In the promulgation of a multiple lane median type facility in urban areas, one of the greatest "headaches" is the complaints from abutting property owners with respect to decreased freedom of movement to and from their properties. The cause of such restriction, the median strip, is a thing "close" and apparent to the property owner whereas with the alternative one-way treatment there exists no apparent "new" physical barrier all of which smooths the way in preliminary negotiations and in some cases may mean the difference between a project or no project.

Regarding public reaction, the department has not, under its own sponsorship, attempted any organized public opinion surveys with respect to one-way streets. However, some information has been obtained in this direction by interested local agencies in the city of Eugene. This poll was made more directly with respect to the overall

HIGHWAY US99 THROUGH CITY OF MEDFORD

COMPARATIVE DATA BEFORE AND AFTER

INSTALLATION OF ONE-WAY STREET COUPLET

Population: 11,281 Year: 1940

Date One-Way Couplet Installed: March 8, 1942

Cost of Improvement—Inclusive of rights of way and construction costs: $99,000

"Before" Period: January 1, 1941 to December 31, 1941

"After" Period: January 1, 1943 to December 31, 1943

Item	*Before*	*After*
Length of Highway Section—Miles	2.0325	2.0325[1]
Number of Moving Lanes on Highway Route	2	4
Type of Parking	Parallel	Parallel
Average Daily Traffic	11,678	11,090
Annual Vehicle Miles	8,663,900	8,226,900
Number of Accidents	163	84
Accident Rate—Acc./Mill. Veh. Miles	18.81	10.21
Travel Time—Minutes	[2]	[2]
Signals	1	3

[1] Total miles in couplet divided by 2.

[2] No data available.

one-way street grid in the downtown area in Eugene which was put into effect subsequent to the one-way street couplet highway routing in that city. However, the poll did concern and indicates reaction on the part of local people, particularly business men, to the general scheme of one-way traffic. A brief recap of the results of this poll is as follows:

365 voted
52 votes to abolish outright
103 approved grid as-is
164 wanted some modification
46 wanted some changes but made no recommendations

A negative reaction which has been voiced in several instances has emanated from people moving on cross streets with respect to one-way street couplet, to the effect that speeds had increased on the one-way street to the extent that cross-traffic could not "break through." This negative reaction is generally corroborated by actual speed checks after installation of the one-way street. It does however,

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HIGHWAY US20 THROUGH CITY OF LEBANON
COMPARATIVE DATA BEFORE AND AFTER
INSTALLATION OF ONE-WAY STREET COUPLET

Population: 2,729 Year: 1940

Date One-Way Couplet Installed: July 1, 1948
Cost of Improvement—Inclusive of rights of way and construction costs: $151,000[2]
"Before" Period: July 1, 1946 to July 30, 1947
"After" Period: July 1, 1948 to June 30, 1949

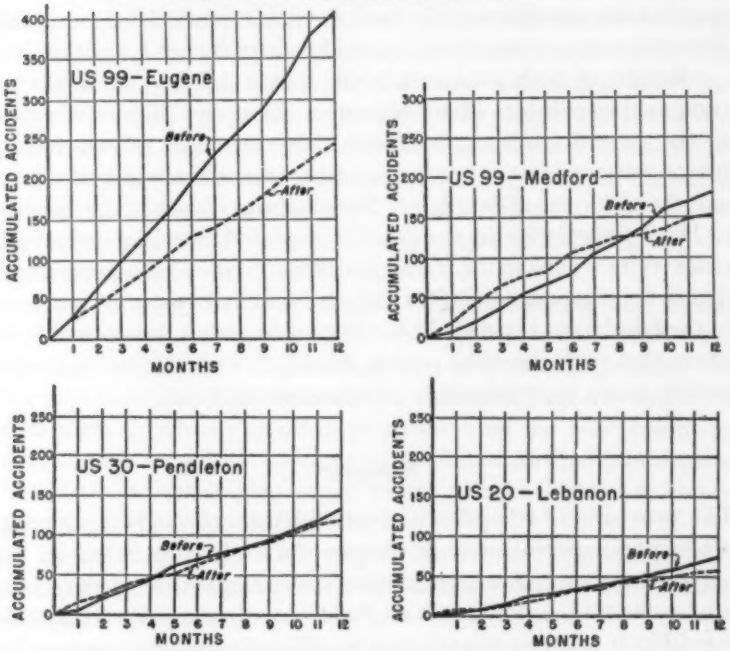
Item	*Before*	*After*
Length of Highway Section—Miles	0.5769	0.6799[1]
Number of Moving Lanes on Highway	2	4
Type of Parking	Parallel	Parallel
Average Daily Traffic	9,446	10,380
Number of Accidents	74	74
Accident Rate—Acc./Mill. Veh. Miles	37.20	28.73
Travel Time—Minutes	1.86	1.76
Signals	0	0

[1] Total miles in couplet divided by 2.
[2] Construction project includes costs of 0.44 miles of 4-lane section of highway and a 45-foot reinforced concrete bridge.

Highway US 20 Through City of Lebanon

substantiate and prove that one objective has been accomplished, namely, increased traffic mobility. This situation on the part of cross-traffic movement should be given due consideration. The answer lies in installation of a progressive signal system on the one-way street couplet.

MONTHLY TREND IN ACCIDENTS
BEFORE AND AFTER INSTALLATION OF
ONE-WAY STREET COUPLETS



NOTE: US 99W—Corvallis: Recent installation—study incomplete

In this connection it would be desirable to make the progressive signal system installation an integral part of the project at its inception. Here again, in actual practice, money limitations have precluded coincident installation of the one-way street couplet and progressive signal installation. Traffic-wise, the job cannot be considered complete until the signals can be installed and put into operation.

From an analytical standpoint and in connection with before-and-after studies in general, it must be accepted that immediately following the instigation of any new traffic control device or traffic facility there needs be a certain transition or educational period on the part of the motoring public before they can become fully acclimated to revised travel pattern. In the course of compiling the before-and-after accident data with respect to one-way street routings in the several cities, attempt was made to determine the required time span for this transition period and the point at which improvement in accident experience begins to evidence itself.

Results of such exploration are shown graphically in the accompanying exhibit. There appears to be no set pattern common to the several cities studied, with this transition or educational period ranging from one or two months to an extreme of some eleven months in the case of Pendleton. No particular reason can be ascribed to lack of similarity in the transition period between the several cities. With regard to the transition period, it should be pointed out that in the comparative before and after accident values as contained in the tabulation as time and further study permit, it appears quite likely that with the after period chosen to exclude the transition period, much more favorable comparison will result.

Summary

The provision of adequate highway facilities through the smaller urban population centers in Oregon does offer a problem to the highway engineer. The term *problem* over-emphasizes, perhaps, the intricacies of the situation. It might be more to the point to say that it is difficult to arrive at a solution possible of realization moneywise and at the same time, one that is acceptable to the motoring public and more particularly, to the local citizenry. Notwithstanding the "paper profits" that may be cast up in support of elaborate highway facilities, until such time as the motoring public can be educated and will accept a heavier tax load necessary to realization of more expansive facilities, the only alternative for the operating engineer is the development of less expensive treatments.

The use of the one-way street couplet as a means of handling

highway traffic through the smaller urban centers has, where physical pattern of existing street grid permitted, proved to be a successful treatment. It is reiterated that the one-way treatment which has found application in Oregon, is not necessarily considered in the light of a "stop-gap" measure. In many cases the level of traffic service provided by the one-way couplet will suffice for some years to come.

Experience in these matters bears out the fact that the highway administrator must spend an increasing part of his time in public relations work. Often the promulgation of a plan of treatment that may be technically sound and for which money is available, falls short of realization due to public opposition. Any misgivings of a sincere public should have the utmost consideration by the administrator and with presentation and explanations this segment can usually be convinced. In many cases however, it is not a sincere public segment back of the opposition; rather, a minority special-interest group that defeats the plan.

In promoting the one-way street treatment among local officials and their constituents, one of the best approaches is to picture and explain the plan as a divided-highway proposition, granting that the plan is not the "glamorous" type of divided highway ordinarily visualized. It usually helps to point out that the less pretentious treatment is something that can be instituted forthwith as opposed to a more expansive plan which would necessarily have to be programmed over an extended period.

Although from certain quarters there is still opposition to the one-way street treatment, such opposition—through actual installation and trial over the past few years—has progressively decreased. This treatment of particular situations appears to be a sound approach, and additional installations in other of the smaller population centers in Oregon are contemplated.

For Sound City-State Relationships

NORMAN HEBDEN

Mr. Hebden is a Research Associate in Transportation at the Bureau of Highway Traffic, Yale University. Since May, 1948, under a grant from the Alfred P. Sloan Foundation, he has been conducting a special research project concerning the administrative relationships between the states and cities in highway activity. Prior to joining the Yale faculty he had been Executive Director of the American Public Works Association, a national organization of engineers in the public works field, had served as editor of its publications, and directed its research activities. Earlier, he was for several years associated with the U. S. Bureau of Public Roads. He has served as a consultant on various administrative surveys of public works organizations, and recently he directed the public works study for the reorganization of the state government in Connecticut. This article presents highlights of the current research project on state-city relationships; Wilbur S. Smith, Associate Director of the Yale Bureau of Highway Traffic, has collaborated. A book, "State-City Relationships in Highway Affairs," presenting the full report of this study, is being published by the Yale University Press.

NEARLY eighty-five million people in the United States live in cities, almost 59 per cent of our population. These city-dwellers, who pay about nine-tenths of all federal, state, and local taxes, own or operate more than half of the nation's 41 million motor vehicles.

Last year automotive transport (passenger cars, trucks, and buses) rolled up the prodigious total of 400 billion vehicle-miles of travel. Of particular significance, one-half of this traffic movement (200 billion vehicle-miles) took place over city streets that constitute but 10 per cent of the nation's total mileage.

The huge volume of traffic represented by this movement is compelled to thrust its way painfully along existing inadequate city streets, impeded by narrow widths, poor layout, parked vehicles, and frequent intersections with their traffic signals, turning movements, and pedestrians. Small wonder the traffic problem looms as the biggest headache of the cities.

There is little need to reiterate our plight in this respect. Whether pedestrian or driver, most of us experience daily the extreme irritations of urban traffic congestion; and its severe toll on the economic life of our communities is demonstrated by the widespread occurrence of blighted areas, reduced valuations of downtown property, mounting accidents and delays, and the flight of business to outlying areas.

Admittedly the rapid urbanization of the populace and the skyrocketing development of motor transport outstripped our foresight and ability to keep pace by providing adequate physical improvements in urban areas. This is all the more reason why an objective attitude and positive action are now demanded.

Numerous palliative traffic regulations and controls are applied by traffic engineers. They definitely alleviate some conditions, especially in localized areas. But for effecting a solution, the underlying causes and the sheer magnitude of the urban congestion problem are far beyond the possibilities of such measures.

In urban areas bold steps must be taken. Extensive new facilities to provide for both safe and efficient traffic movement and adequate vehicle storage are required. Highway and traffic officials are keenly aware of this. The rub comes, however, in the enormous costs involved in providing the modern controlled-access roadways and well-designed terminal facilities so urgently needed.

Who is to shoulder the financial and administrative responsibility for these improvements? How can they be financed? Where are they to be located? With these questions, federal, state and city officials are wrestling. Answers for them must be found.

Congestion Demands Cooperative Action

State highway administrators generally agree that the cities cannot solve the problem alone. The heavy costs involved, the cities' restricted tax base, and the pressing demands for other new and expanded municipal services preclude such a course. Indeed, there is a growing opinion that the cities should not even be expected to shoulder the largest share of the burden of providing the *major* arterial improvements.

There are two reasons for this. One is the considerable element of state interest in such facilities. The other is the fact that in the distribution of highway-user revenues, city streets have been virtually overlooked as compared to state and local roads. (State legislatures and special interest groups acutely need to understand and fairly appraise the equities involved, based on the facts of road usage and of needs both rural and urban.) As a result of the enlightened viewpoint of progressive highway administrators, the realization is steadily growing that solving the urban traffic problem is a matter of joint responsibility and cooperation between the several levels of government.

Records reveal that state participation in highway work in cities has been slowly but steadily increasing, especially in recent years. This trend was markedly affected by the advent, in 1944, of federal-aid funds earmarked for expenditure in urban areas. The original impetus thus given was continued by the authorization of further funds for this purpose in 1948, and it seems probable that this will become established federal policy. New areas of responsibility and problems of state-city relationships have come to the fore, and close cooperation between the two levels of government is an absolute essential. It calls for a searching analysis of the factors involved in these relationships and the determination of a sound course of action.

First and foremost, both state highway and city officials should develop a greater knowledge and understanding of each other's problems. In all likelihood new procedures will have to be devised, additional authority will be needed, organizational structures will have to be re-examined. Complete coordination in planning will be essential, as well as agreement on a mutually satisfactory division of responsibility.

The task will not be an easy one inasmuch as the relationships are new; only a few states have had extensive experience in urban highway work. Consequently it is important that both state and city officials recognize and guard against certain complicating factors which are inherent in the problem. They must overcome any spirit of competition between themselves as well as bias toward their own authority and concepts, and they must be prepared to resist strongly,

misguided efforts of special interest groups. Furthermore, preconceived ideas must be abandoned. It is paramount we never lose sight of the fact that the interest to be served is the public interest.

Both the states and cities have a vital stake in the location, plans, construction, and operation of urban arterial highway facilities. Their interests are inextricably bound together in every phase of the work. The effective, close cooperation demanded requires the development of a sound, well-ordered system of state-city relationships.

Special Research Project Undertaken

To help achieve this end, a special research project, financed by the Alfred P. Sloan Foundation, was undertaken at the Bureau of Highway Traffic, Yale University. The study, on which this article is based, was started in May 1948; and a detailed analysis and evaluation of the administrative relationships between the states and cities have been made. A full report of the findings and conclusions, published by the Yale University Press and titled, "State-City Relationships in Highway Affairs," will be available in the near future.

The purpose of the study was to determine and evaluate administrative policies and procedures followed by state and city agencies, to bring the practices together for review as to the ways in which they evolved, and which ones appear to work best; to point up the environments and circumstances which influence practice; to suggest means of effecting better coordination, and to develop a framework for an orderly system of state-city relationships. The study aims to stimulate the thinking of the operating officials as well as to encourage a higher degree of cooperative effort.

While it is recognized that the federal interest in the problem is extensive, the project was of necessity limited to state-city relationships. Moreover, it was firmly believed a greater contribution would ensue from a thoroughgoing study of a selected group of states than from a more superficial survey of practice in the 48 states. Therefore, the states and cities were carefully selected to represent the various types of organizational structures, administrative procedures, and degrees of experience in urban work as well as to represent variations in geographical location and economic conditions. The case-study

method was used; and studies were completed in 12 states and 22 cities as listed:

States	*Cities*	*States*	*Cities*
California	Fresno	New York	Rome
	Sacramento		Schenectady
Connecticut	New Haven	Oregon	Portland
Illinois	Bloomington		Salem
	Springfield	Rhode Island	Providence
Minnesota	Rochester	South Carolina	Columbia
	St. Paul		Spartansburg
Missouri	Columbia	Texas	Austin
	Kansas City		Houston
New Jersey	Newark	Virginia	Norfolk
	New Brunswick		Richmond

Key state and city officials responsible for administrative policy and the execution of the work were interviewed to obtain full information as to (1) authority for urban work, (2) extent of state activities in cities, (3) financial aid for cities, (4) organizational structures of departments, (5) working procedures covering all activities, and (6) personal attitudes and appraisals. During the course of the research project we were privileged to have the advice and counsel of a small group of outstanding state and city officials who served as an Advisory Committee. Its members were: R. H. Baldock, state highway engineer, Oregon State Highway Commission; C. A. Harrell, city manager, Norfolk, Virginia; Spencer Miller, Jr., commissioner, New Jersey State Highway Department; and George M. Shepard, chief engineer, Department of Public Works, St. Paul, Minnesota. Their assistance was invaluable; however, it should be made clear that the responsibility for the findings of the study and the conclusions drawn is solely that of the authors.

Some Highlights of the Report Findings

Throughout the study numerous adverse factors and muddled conditions were noted in the whole realm of state-city relationships in highway affairs. But it should be emphasized at the outset that to

overstress the negative aspect would be inappropriate, for many positive factors are at work. Some existing conditions certainly leave much to be desired and are sore spots in achieving good state-city relations; yet many of the differences indicate healthy controversy and negotiation out of which sound programs will ultimately develop. Differences, conflicts, and compromises will inevitably arise in reaching decisions, but out of these usually come the soundest results.

Careful analysis and appraisal of the whole matter in question point up several basic propositions. These, it can be favorably reported, are already recognized in fairly large degree by state and city officials alike. It is apparent that (1) the states must accept a large share of responsibility for urban arterial improvements; (2) no matter how administrative and financial responsibility may be shared, there must be provided an integrated, nation-wide system of highways *continuing through the cities* which, in turn, compels a high degree of cooperation and close relationship between the states and cities; (3) the problem can only be solved by a planned approach; and (4) the well-known constraining factor "inertia" must be overcome, and vigorous action based on sound judgment must be substituted.

Sound Fact-based Policy Needed

What are some of the needed revisions in the basic precepts of state-city relationships that were indicated by the analysis of existing practice? Of fundamental importance, it was found that the extent of state assistance to cities in highway and traffic matters covers an extraordinarily wide range—from almost nothing to extensive aids and services. Also, in the matter of the division of responsibility—administrative and financial— practices varied widely between states and even between cities in the same state. While no single pattern is to be expected in these things, current practice gives little evidence of having been established on the basis of careful analysis and sound principles. Rather it has "just grown."

The present confused situation exists largely because of the states' reluctance to adopt an objective attitude, to accept and be

guided by facts, and because highway policy is rarely established on the basis of factual need but rests in a too large degree on the exigencies of politics. Legislatures and special interest groups, rather than highway administrators must bear any censure for this circumstance. Admittedly, in dealing with human motivations, perfection will not be achieved. But in a democracy, reforms are possible; and in determining basic highway policy, a more enlightened, sound policy is long overdue.

In this day of serious inadequacies in the highway and street systems and of high costs, it is time a comprehensive review of the whole highway problem was made by every state. Even spot checks are sufficient to reveal the urgent need for a restudy and reclassification of the complete road and street system in every state where this has not been done recently. Essential economy in expenditures and equitable policy demand such action based on facts.

Too few states have developed a long-range improvements plan, including a financial program. Yet only by developing such a plan can state highway officials delineate the task that confronts them in its entirety, and effectively program its accomplishment. Such a plan is as essential and as valuable to the legislature as to the administrative staff.

Authority Should Be Implemented

Turning now to some other specific aspects of the problem of intergovernmental relations, we find a prime question is that of authority. Most states do not have as broad authority to participate in urban highway work as they do in rural areas. In a number of instances, for example, the statutes are not specific in permitting the state to acquire right of way in cities; sometimes the state is not enabled to enter into agreements with cities, and in some cases the state does not have control over traffic operations.

Also among such limitations, two important powers are frequently found to be lacking. One is the power of excess condemnation; the other is the granting of extraterritorial planning powers to cities. Both would be helpful in permitting a direct attack on specific problems, such as housing in the former instance, and integrated planning in the latter. Obviously state supervision over traffic

control devices and regulations would foster more rapid development of uniformity in this segment of the field.

Many states permit the highway department to engage in work in cities. This puts the state in a most favorable position in negotiating with cities. This may lead to non-uniform treatment and oftentimes results in poor relationships between the governmental units.

Revamped Policies and Practices Needed

In many instances administrative policies and practices leave much to be desired. Among the most important weak spots were the planning and programming of urban projects, and in the division of administrative responsibility and costs of highway and traffic improvements.

The selection and location of proposed urban projects represent points of closest possible contact between the states and cities. To achieve effective cooperation in these endeavors, the state highway planners and engineers need to work closely with their city counterparts from the inception of a project. In many cases, however, such collaboration is weak.

New improvements may have a marked effect upon the present characteristics of a city and upon its future development and growth. The cities universally cited a tendency of the states to fail to give adequate consideration to this fact, with over-emphasis of construction cost to the neglect of broader economic and social considerations.

Thoroughfares of joint interest and the problems of congestion thereon are of major concern to the cities. Yet many state officials cited a seeming lack of interest and sense of responsibility on the part of cities in urban projects a state is undertaking. The answer to this probably rests in the states' granting the cities a larger degree of participation in the preliminary planning, coupled with a requirement that cities share some portion of the project cost.

Uniformity in policies and procedures is essential if sources of friction are to be avoided in the execution of work which is of joint interest. All too frequently there is a lack of established policy applying across the board, and of the use of administrative regulations which would serve to keep cities informed of the state's position.

Thus, areas of responsibility the states will assume are not clearly defined. Wide variations exist with respect to the matter of sharing costs of urban highway improvements and traffic control facilities. In the majority of instances the cities are required to pay the cost of right of way or some portion thereof, and with traffic control devices they generally are responsible for maintenance and operating costs.

Many state highway officials seem prone to believe that administration by the state is the only feasible practice. This is probably because it appears to be the most direct and easiest course. On the other hand, city officials dislike relinquishing local control over city streets, which is especially true in the case of maintenance.

Despite the widespread acceptance of that belief on the part of states, many examples were observed of successful local administration of projects in which there is joint responsibility. This type of procedure merits most careful consideration by state officials. While some degree of state supervision is entailed when it pays the bill, such control need not be onerous and, in fact, has some salutary features.

What about the plan of organization of a state or city agency as it affects intergovernmental relationships? Only two of the 12 states have deemed necessary the establishment of special urban units within the highway department with duties extending beyond conventional state-aid controls (accounting and auditing functions). Few state and city officials were of the opinion that a special urban unit at the state level is necessary. On the whole, most state officials prefer to have their established divisions or bureaus handle those phases of urban work which fall within their respective areas of activities.

City officials generally are satisfied with existing state organizational structures. The only real point made by them was the need felt for some specific point of contact within the state highway department where administrative matters and details of negotiations could be taken up and expedited. City officials, moreover, prefer to work with the state district engineer, feeling that he is closest to their problems and is most familiar with their needs.

At the city level, no organizational changes appear to be necessary or desired. Here, state officials definitely prefer to deal with the

head of a city's engineering organization; and they would like to see that administrative official delegated greater powers of negotiation.

Still another matter of importance is that of the development and use of standards for urban projects. While most of the states are following some general standards, only half of the states studied indicated that they had established rather well-defined design standards and specifications for urban highway facilities. There is need for the development and adoption of national standards for urban facilities similar to those which are already in effect covering highway design and traffic control devices.

In developing such standards the advice and comment of representative city engineers should be sought. Such minimum standards should not have excessive requirements, but experience has amply demonstrated that high standards must be adhered to. Too many so-called modern highway facilities in the past have become inadequate in no time because of the lack of sufficiently bold vision.

Lastly, with respect to the working procedures involved in the actual day-to-day carrying out of urban highway work of joint interest, the greatest degree of administrative flexibility is desirable. Many situations arise which may make it most desirable for a state to perform some phase of the work in one instance, and a city in another. Consequently, established working procedures covering such activities as the preparation of project plans, the procurement of right of way, supervision of construction, and maintenance work should all be optional as to whether the work is performed by the state or city. Again, many successful examples of such procedures were observed in the field. The whole task of bringing our highway system up to a satisfactory condition and maintaining it is so formidable that the marshalling of all resources and skills, both city and state, is required.

Achieving Improved State-City Relationships

The foregoing discussion presents just a few of the highlights of the findings of the study which treats the many segments of state-city

relationships from the point of view of planning, construction, maintenance, and traffic operation. These are spelled out in depth and detail in the forthcoming report.

On what basis can the states and cities best work together? The following steps outline a number of important actions necessary toward achieving the much needed, orderly system of state-city relationships in highway affairs:

1. The states should review their highway laws and revise them, where necessary, to define clearly state responsibility for urban highway work and to provide the necessary authority to discharge that responsibility.

2. The states should conduct a "highway needs" study in order to ascertain over-all improvement needs, both rural and urban, enabling the formulation of a sound highway policy and the development of a state-wide improvement program.

3. The states should formulate comprehensive policies governing urban work and these should be uniformly executed.

4. The states and cities should strengthen their organizations in the interest of better coordination; the former primarily by designating a staff engineer to coordinate and expedite urban work, the latter by assigning to the head of the engineering or public works unit responsibility for coordinating all work involving the state and delegating to that official greater powers of negotiation of details within fixed policy.

5. The states and cities should jointly establish an urban highway system to serve all important inter- and intracity traffic needs.

6. The states should collaborate closely with the cities in determining needed improvements, their location, order of priority, and details of plans.

7. Optional working procedures should be provided covering the performance of all phases of joint urban highway work; and as much local participation and administration as possible should be encouraged with adequate state supervision.

8. Broad state control over traffic operation should be inaugurated in the interest of obtaining essential uniformity.

In developing sound state-city relationships it is encumbent upon city officials to cooperate with and assist the states to the fullest

extent. However, major responsibility for the task rests with the states. They alone have the power to determine how responsibility will be divided and what procedures will be followed. Therefore, accomplishment of this important task is dependent upon effective action by state highway administrators and state legislators.

Tribute is due the nation's highway administrators for their capabilities, resourcefulness, and energy in overcoming difficult technical problems in achieving the great advances made in this field. The real problems today, however, are those of administration; and in this we are dealing with people, not things.

Solutions cannot simply be blueprinted. State-city relationships stand in the forefront of such problems and offer a real challenge. Effective answers to the urban congestion problem will be found only in so far as state highway and city officials are willing to discard preconceived ideas and are willing to experiment and act together.

A $200,000,000 Secondary Road Plan in North Carolina

DR. HENRY W. JORDAN

Dr. Jordan is Chairman of the North Carolina State Highway and Public Works Commission. He practiced dentistry for twenty years. In 1940 he entered the textile manufacturing field and is President of the Sellars Manufacturing Company at Saxapahaw, the Jordan Spinning Company at Cedar Falls and the National Processing Company of Burlington. He has served as a member of the Gaston and Randolph County School boards. From 1945–49 he served as North Carolina's Sixth Division Highway Commissioner, succeeding A. H. Graham as Chairman of the Commission February 1, 1949.

IN A special state-wide election on June 4, 1949, the people of North Carolina voted overwhelmingly to spend $200,000,000 on their 52,195-mile secondary road system. This was a historic decision for several reasons:

1. No other state ever authorized the expenditure of such a large sum on secondary roads.

2. Besides approving a $200,000,000 bond issue, the people also voted to increase their state gasoline tax from six to seven cents.

3. Only three other states maintain their county road systems, and these three (Virginia, West Virginia and Delaware) have jurisdiction over much shorter mileages than North Carolina.

People outside North Carolina have asked the Highway Commission to explain why our citizens endorsed so enthusiastically a program proposing only secondary road improvement. The significance of their sentiment cannot be properly evaluated without some knowledge of the development of North Carolina's road system since the early 'twenties.

During the decade beginning in 1920, North Carolina departed abruptly from the "pay-as-you-go" philosophy of roadbuilding and issued bonds in the amount of $115,000,000. These bonds built one of the finest primary road systems in the nation. This was a bold

move for the times, and calamitous warnings came from many citizens when the state legislature approved it.

These gloomy predictions never materialized. On the contrary, the beneficial impact of good-roads-built-quickly made itself strongly felt throughout North Carolina's economy. The state's 100 county seats, many of them isolated and mud-or-dust-ridden, suddenly found themselves linked with each other and the outside world. North Carolina, once known as the "Rip Van Winkle State," aroused herself further from the poverty and economic chaos that had afflicted the whole South after the Civil War.

All the remarkable progress North Carolina made during these early decades cannot be attributed to good roads, but a great deal of it can. North Carolina's most accelerated development occurred during the era when her principal towns and cities acquired serviceable all-weather roads. Many citizens feel that the bond issue of the 'twenties helped North Carolina achieve her position as one of the South's wealthiest and most progressive states. During the 1949 better roads campaign, the successful experiment in the 'twenties was cited as an excellent reason why North Carolina should step forward again. Supporters of the program felt that extension of good roads into the undeveloped rural areas would pay off big dividends just as the primary road program had done earlier.

State Takes Over County Roads

In 1931, the Tar Heel State took another significant step in road-building. Largely because her county governments were unable to continue the maintenance of their secondary roads, the state assumed responsibility in this field. By a single legislative order the state highway commission took over jurisdiction of 45,000 additional miles of roads, bringing its total responsibility to 54,000 miles instead of 8,798 miles.

This legislative act established the foundation for the successful Better Roads campaign of 1949. Before 1931 the people had looked to their county governments—not their state government—for improved rural roads. As the state's highway system evolved from a responsibility for a limited mileage of major highways to one requir-

ing supervision of thousands of miles of secondary roads, a growing clamor arose from those segments of the state's population living in the dirt road regions.

This pressure was not destined to go unheeded since it represented a substantial portion of North Carolina's citizenry. In spite of remarkable growth and diversification, this is the key to the secondary road program. North Carolina has remained a state of small cities and small farms, overshadowed by no large urban areas. She is still predominantly rural in outlook and deeply concerned over rural services. Her first farmer governor in half a century, W. Kerr Scott (inaugurated last year) continually emphasized, along with planning experts like Lewis Mumford, that North Carolina is better prepared than almost any other state for the new Atomic Age of dispersed living.

Governor Scott echoes the sentiment of many Tar Heels when he says North Carolina ought to keep her citizens contented to live and work where they are. The advantages of the city should be made available to the country, he believes, while avoiding urban slums and congestion.

This constituted the general philosophy behind the Governor's campaign for a $200,000,000 secondary road bond issue. Having lived on a dirt road most of his life, he had first-hand knowledge of the problems of rural people, especially their road problems.

The Governor studied these problems at great length before his inauguration to determine the wisdom of again departing from the "pay-as-you-go" philosophy.

School Bus Survey

He launched an important research project designed to bring him first-hand information about road conditions in North Carolina. This survey showed that of the state's 63,000 miles of roads, 41,814 miles were used by school buses; that only 13,973 miles (33.4 per cent) of this school bus mileage were paved, leaving 37,841 miles unpaved. The survey further showed that about 7,719 miles of these unpaved roads served as multiple or stem routes, carrying two or more school buses everyday.

These 7,719 miles of unpaved school bus roads composed the nucleus of the Governor's contemplated road improvement program. His researchers, after conducting 17 meetings of various cross-sections of citizens throughout the state, determined that these 7,719 miles should be hard-surfaced. Maps accompanying the surveys showed that it would be necessary to add about 50 per cent to this heavier traveled school bus mileage to make a connected system of roads. Out of this survey came the figure 12,000 miles of hard-surfacing which comprises the major part of the Governor's goal.

In order that the Highway Commission might meet the obligation it had on the less heavily traveled roads, the Governor called for a 35,000-mile stabilization program designed to give some attention to the residue of unpaved mileage on the secondary road system.

Next, the Governor had a study made of the Highway Fund to determine whether it had sufficient resources to carry out this program. His study showed that current revenue from automobile use taxes (the principal source of highway income) was not adequate to handle an expanded secondary road program and at the same time recondition the badly-worn primary highway system. A surplus had existed in the Highway Fund since the end of the war in 1945, but that represented the amount of normal work the Highway Commission had been forced to forego during the war years. It was expended, as predicted, by July, 1949.

Before determining how the secondary road program might be financed, the Governor and his associates sought to compute just how much additional money the Highway Commission needed. Most of the individuals connected with the surveys agreed that the entire program could not be financed for anything less than $200,000,000—but a great many of them felt that the people would never vote a bond issue of that size. There were proposals that the state gasoline tax be lifted two or three cents and combined with a bond issue of $100,000,000 or $150,000,000. There was real concern in some circles that such a large hike in gasoline taxes would never be approved. Governor Scott stuck firmly to a $200,000,000 bond issue. He felt that the people, knowing the need for the roads, would vote the issue through.

Finally, the group struck a compromise. The Governor would

request a $200,000,000 bond issue and a one-cent hike in the gasoline tax to finance the repayment of the bonds over 20 years. Governor Scott presented this proposal to the General Assembly in January, 1949, and it became a hotly-contested issue. After months of debate the Legislature approved a bill calling for a special election by the people to determine whether they approved such a program. In this special election, called by Governor Scott for June 4, 1949, the people approved the bond issue and the tax increase. The Governor's newly-installed highway commissioners moved into action immediately. By the end of summer they had surveyed the state's 47,000 miles of dirt roads. By September 28, 1949, the first $50,000,000 in bonds had been sold and actual work was in progress throughout the state.

Much Roadbuilding Ahead

By the end of the year the Commission had finished about one-tenth of the Governor's 12,000-mile paving program. As 1950 opened, the Commission was poised for its greatest year of roadbuilding with sufficient funds for the first time to handle both the needs of the primary and the secondary road systems.

What about the future?

Highway statisticians think that the hard-surfacing of 12,000 miles of the secondary system will reach substantially all of those roads whose potential traffic justifies that type of improvement. Although no statistics are available on secondary road traffic count since the year 1947, it is believed that a number of roads having traffic counts as low as 100 vehicles per day will be paved during the next four to six years. The philosophy of the Scott program visualizes a rapidly expanding economy for North Carolina—and to some extent minimizes the value of figures which show how much traffic ran over a road before its improvement.

Experience clearly shows that traffic picks up considerably once road improvements come. For instance, in a 1937–38 survey of the state's secondary road system it was noted that the 46,613-mile system carried an average of 51 vehicles per day.[1] Ten years later that average had risen to 87 vehicles per day or a 70 per cent increase.

[1] The 46,613-mile secondary system develops 2,377,000 vehicle-miles of daily travel, producing an average of 51 vehicles a day.

North Carolina and the southeast are growing with the nation. The Scott program presumes with optimism characteristic of the Governor himself that this growth will continue. If it continues, the Scott program will provide the foundation for extensive new economic development in North Carolina. Governor Scott has emphasized the human element in roadbuilding. He has approached the problem from the viewpoint of little children getting to school and rural people getting their crops to market. This has broadened the purely statistical basis which influenced the growth of the highway system at certain times in the past.

Some highway engineers believe that the Highway Commission should not hard-surface any road which carries less than 200 vehicles per day. They base their opinions on the theory that any less heavily traveled road will not pay for its own upkeep. Governor Scott maintains that many roads which do not attract much traffic now will easily do it after the road is paved.

All other questions aside, the most important point about the North Carolina secondary road program is the fact that the people themselves were enough convinced of its soundness to increase their own taxes and borrow $200,000,000. If the North Carolina program carries through to a successful conclusion, it might very well stand as a milepost in the development of a new philosophy in roadbuilding for the nation.

Certainly North Carolina has moved considerably further than any other state in tackling the problem of the secondary road. The future alone will reveal the success or failure of the Tar Heel plan.

By-Passes for Small City and Town

MYER ABLEMAN

Mr. Ableman is a senior engineer on special assignment with the Surveys and Plans Bureau, Missouri Highway Department, working primarily on state urban projects. After graduating as a civil engineer, he was employed on construction for two years with the Illinois Highway Department. For ten years Mr. Ableman was a highway designer in Missouri. For five years during World War II he was an officer in the Corps of Engineers, first in charge of construction of camps and air bases and later in charge of maintenance at an air base. For the past four years he has been employed in his present position.

A RETAIL fruit and produce merchant returning in his truck from a large city wholesale market complained bitterly to his driver because they had to travel on a high traffic-density street, with three stops at intersections, in a town of 4,000 population.

"It's about time the highway department did something about through-traffic using this street," he declared. "We have to slow down to a snail's pace and stop three times. Last week I almost hit a child near the school in the next block. They ought to build a by-pass around the edge of the town."

This merchant's business was situated on the same marked highway in a town of 6,000 population about twenty-five miles away. When the state highway department started an investigation for a by-pass around his town and business, he was the first to sign a petition requesting that the through-traffic marking remain unchanged.

This illustrates the public attitude that may be expected. It is unfortunate that the influence of business men who feared loss of business was reflected in the location of highways through and near towns. In recent years, however, there appears to be a reversal of opinion among the owners of retail businesses as to the value of through-traffic to their establishments. Before World War II a grocer located on a through-highway said he hoped the state highway department would not build a by-pass to eliminate through-traffic on the street where his store is situated. As he had hoped, the by-pass

was not constructed. Last week that same grocer wanted information as to when the state highway department could do something to take through-traffic off his street.

"I lost a customer last month," he said, "because her small daughter was almost run over trying to cross the street to reach my store. This lady now trades with a grocer on her side of the highway. I used to have school children who must cross the street come to my store but they are staying away now. The business from the few people who travel through town and stop to buy some small articles is insignificant compared to the business I lose because of fast travel and congestion on the street."

Origin-Destination Studies for By-pass Needs

Prior to 1940 the technique of making origin-destination studies of traffic was not well known. Before that time, the determination of whether or not a by-pass was needed was based in all too many cases on traffic volumes at the two edges of the town. If these two volumes were reasonably high and the topography and alignment were good for routing around the town, the by-pass was built, if funds were available; provided, of course, that local pressure did not succeed in stopping the construction.

Now, however, with origin-destination studies the highway engineer can determine the average volume of traffic that desires to travel around a town without stopping. This volume only is considered in the economic study to decide whether or not a by-pass is justified, because practically all other traffic would continue to use the city streets.

In his investigation, the highway engineer must remember to use the *total volume* that would use the by-pass. Many base their studies on a *percentage* of the traffic with no desire to stop in town. However, a large percentage of traffic desiring to by-pass a town on a low-volume traffic road might not warrant the construction of a by-pass, whereas a small percentage of a high-volume traffic highway would require such construction.

An example of the latter is contained in the origin-destination study of St. Louis, Missouri. This study indicated that less than one

per cent of the traffic desired to by-pass the city, yet that small percentage plus some local traffic required the construction of a by-pass with more than two lanes for almost its entire length.

Before deciding whether or not an origin-destination study is warranted for investigating the necessity of a by-pass, the highway engineer should make some common-sense deductions. They are:

1. Does the volume and type of traffic indicate the need of a by-pass? If the traffic volume on either side of a town is low on a particular highway, a by-pass is not needed. However, should the volume at the two edges of the city be high, the points enumerated below should be studied.

2. Is the town small or large? High volumes of traffic at the edges of a small town indicate a large desire to go around it. If traffic counts and nonobservation of safety regulations in either small or large towns indicate a possible need for a by-pass, an origin-destination study probably should be made.

3. Does the city street have sufficient width to accommodate both local and through-traffic volumes? In many towns and cities with wide streets and few stops at intersections, through-traffic is not inconvenienced in being routed through the town. However, on high-volume-traffic streets that are narrow, have short sight-distance and numerous intersections, an origin-destination study is needed.

4. What is the topography and shape of the town? In hilly, elongated towns there would be more reason for by-passes than in level, square towns. In many cases the hilly town has one long, narrow through street upon which most of the local traffic travels, whereas the level, square town usually has many streets available to local traffic. The benefit to the same volume of traffic desiring to by-pass each of these two types of towns can be measured from an origin-destination study.

5. Is the town a trade center? For towns that are large trade centers or county seats, the highway engineer can determine, in many instances, from observation that a by-pass is not needed. However, if he has any doubt, an origin-destination study will aid him in making a decision.

6. Are there larger towns on either or both sides? With larger

towns on either or both sides of the town being investigated, it is almost a certainty that a large volume of traffic desires to use a by-pass. An origin-destination study should be made in these cases.

7. Is the highway a through-traffic road between two large centers of population? On heavily traveled interstate highways, through-traffic volumes are usually high. Origin-destination studies for by-passing towns on such highways are a necessity.

Values Which Determine By-pass Benefits

A number of values, tangible and intangible, determine the economic feasibility of constructing a by-pass. Where tangible benefits are higher than the cost of right-of-way and construction, the project is economically feasible. When the tangible benefits and the cost are near a balance, the indeterminate intangible benefits should tip the scales in favor of the by-pass.

The tangible values are enumerated as follows:

1. Operating cost for less mileage at five cents a mile. When the by-pass is longer than the city street, this cost should be subtracted from the monetary benefits.
2. Time saved at $1.20 per hour per vehicle.
3. Cost of fuel for stopping at $0.00125 per stop.

Some of the intangible factors are:

1. Inconvenience and difficulty in driving through narrow, crowded streets.
2. Danger to pedestrians crossing highway streets. This is especially emphasized where highways pass schools.
3. Alleviation of traffic noises caused by trucks, especially late at night.
4. Benefits to local traffic because of slower speeds and lower volumes of traffic.
5. All of the above add up to a "nuisance benefit."

No value is given to increase or decrease in business.

The method used to evaluate costs against benefits is to estimate them on an annual basis. Amortization of the construction cost may

be based upon twenty-five years of service, which is the average life of concrete pavement before resurfacing is required. Considering the fact that structures and grading have a much longer life, this amortization period is not high and may be increased.

Determining Need of By-pass at Kennett, Missouri

The necessity of constructing a by-pass around Kennett, Missouri, population 6,335, was determined from an origin-destination survey in October, 1945, two months after gasoline rationing had been discontinued. Figure 1 shows the volume of trips with origins or destinations between zones within the city and external highways. The volumes shown were used to determine the traffic-volume using the street over which Routes 25 and 48 were marked. Observations indicated that in the vicinity of the courthouse square traffic-density was exceptionally high on a narrow street, and through traffic was being held up. This was the only east-west street available for through-traffic.

The numbers included in the circles in Figure 2 indicate the volume of traffic that would have used the north and the south by-passes if both had been constructed in October, 1945, based upon the origin-destination study. Small traffic-volumes from county roads and local city streets are not included. A decision was made to build both by-passes, the south one as a primary concrete surface road and the north one with a soil-cement base and a bituminous surface treatment.

From Figure 1 it developed that 492 vehicles per day would have completely by-passed the town on Route 25 on the south line and that 917 would have entered the town on a north-south road using this south by-pass for part of its length. Although there is a benefit to this latter 917 vehicles, this benefit for the most part is indeterminate and therefore was not considered as tangible. Should the tangible benefits that accrue to the traffic that completely by-passes the town be approximately the same as the costs, this intangible benefit might aid in deciding that a by-pass should be constructed.

The following method was used as an economic justification for recommending the construction of the south by-pass:

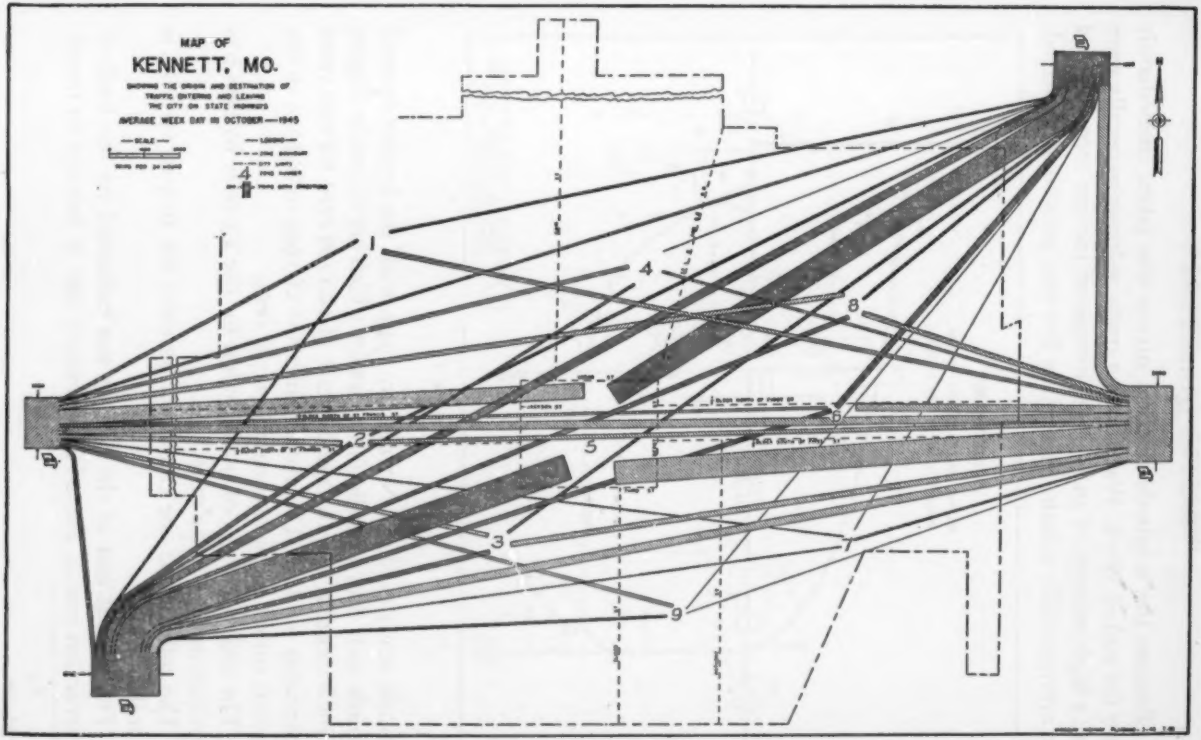

MAP OF
KENNETT, MO.
AVERAGE WEEK DAY IN OCTOBER — 1945
1
2
3
4
5
6
7
8
9

FIGURE 1

Because the origin-destination survey was taken immediately after the end of World War II when traffic volumes generally were low, a high estimate of an average increase of 100 per cent was used for average traffic volume during the five-year amortization period.

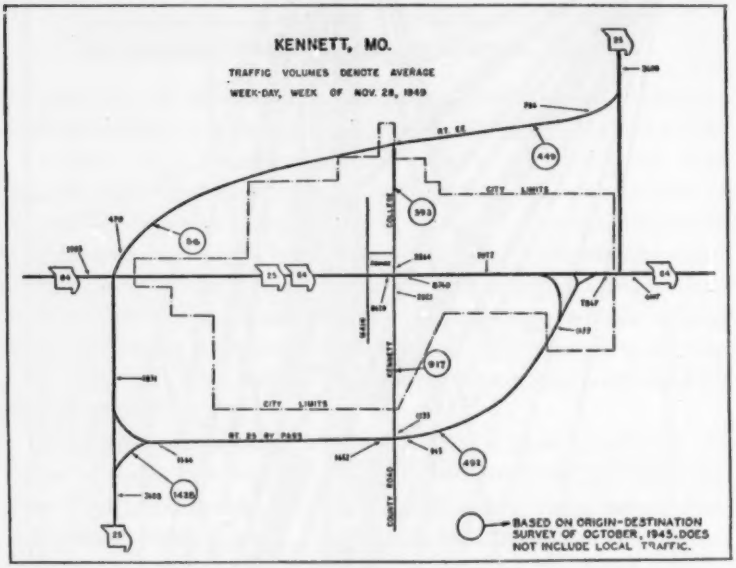

KENNETT, MO.
TRAFFIC VOLUMES DENOTE AVERAGE WEEK-DAY, WEEK OF NOV. 28, 1949
CITY LIMITS
COLLEGE
KENNETT
COUNTY ROAD
BASED ON ORIGIN-DESTINATION SURVEY OF OCTOBER, 1945. DOES NOT INCLUDE LOCAL TRAFFIC.

FIGURE 2

A traffic study made in November, 1949, with the by-pass opened to traffic only four months (volumes for which are shown in Figure 2), indicates that the average increase of 100 per cent for two years is probably too low. The average increase of 1949 over 1945 in the Kennett survey is approximately 70 per cent.

The estimated cost of construction for the 2.5-mile by-pass was $250,000, or $100,000 a mile.

The mileage via the city street between the by-pass termini is 3.0 miles.

The annual cost of the by-pass was estimated on the basis of $\frac{\text{construction cost}}{25}$ + annual maintenance cost + interest on investment, or

FIGURE 3

South by-pass at Kennett, Missouri, completed in 1949. Right of way on this by-pass is 200 feet wide.

FIGURE 4

Route 40 in Columbia, Missouri. Original by-pass around city completed in 1924

$$\frac{250{,}000}{25} + (2.5 \times 500) + \frac{(250{,}000 \times 0.3)}{2} = \$15{,}000$$

A traffic volume of 1,000 trips per day was used as the average traffic that would completely by-pass the town for the 25-year period. The value of the tangible benefits to this volume was as follows:

For 0.5 mile less distance at 5 cents per mile	
$1000 \times 365 \times 0.5 \times 0.05 =$	$9,125

Based upon speeds of twenty-five miles an hour on city streets and forty-five miles an hour on the by-pass, the time saved would be 3.87 minutes at two cents a minute.

$1000 \times 365 \times 3.87 \times 0.02 =$	$28,251
There would be two extra stops via the city streets.	
$1000 \times 365 \times 2 \times 0.00125 =$	$912
Total value of annual tangible benefits	$38,288
Total annual costs	$15,000
Annual tangible benefits above cost	$23,288

In determining whether or not a by-pass or any other highway project can be constructed, funds must be made available to pay its cost through priority ratings with other projects. Some engineers compare benefits to the public for a by-pass to the operating benefits to a railroad company for a track cutoff. There is one major difference in financing: the railroad company actually receives cash benefits with which it can pay for the cost of the project, whereas the monetary benefits received by the public on a highway project are not available for expenditure. Funds for highway projects must come from normal highway users or other taxes. If these taxes do not supply sufficient funds to do all work that would benefit the public, the public must forego some of the benefits that might be made available to it with additional funds.

In the case of the Kennett, Missouri, by-pass project benefits were of sufficient value to place the project on a high priority rating, with the result that it was completed in July, 1949. Figure 3 is a photograph of part of this by-pass, showing its 200-foot right of way.

Other By-passes in Missouri

The Centennial Road Law, which is the basic law setting up the Missouri State Highway System, was passed in 1921 and named the towns through which highways must pass. The framers of this legislation had the foresight, however, to see that some of the highways should be constructed to accommodate through traffic. Consequently they designated 1,500 miles not tied down as to location in that this mileage did not have to pass through named towns.

From this mileage the more important highways were designated. They included Route 40 from St. Louis to Kansas City; Route 66, which is the route from Chicago to Los Angeles, passing through or near St. Louis, Springfield and Joplin, in Missouri; and Route 61, which is a north-south highway along the eastern edge of the state.

Locating engineers took advantage of the law for these three routes. Instead of being located through the larger towns, the highways were placed at the edges of these towns with spurs for local service.

On Route 40, Columbia, which now has a population of approximately 20,000, was by-passed. Some of the smaller towns, including Warrenton, Sweet Springs and Concordia, were also by-passed. However, in each of these cases, especially in Columbia, ribbon business development has encroached upon the narrow right-of-way to such an extent that the by-pass is now a business street. Retail farm implement concerns, cafes, drive-ins, drug stores, cabin camps—yes, even a high school—have been constructed along the by-pass in Columbia so that today the traffic density is so high that speed in the peak hour is low. Because through-traffic is impeded on this by-pass, the highway department has completed plans to construct a by-pass around this by-pass. The new by-pass, however, will have a 300-foot right of way that will be limited as to access. It is believed that both the wide right-of-way and the limited access feature will discourage ribbon development that was encouraged by the narrow unlimited access right-of-way on the first by-pass.

On Route 66, St. Louis, Rolla, Lebanon, Springfield and Joplin have been by-passed. Except for the St. Louis by-pass ribbon develop-

ment has been so great the same treatment probably will be required for all these cities and towns that is contemplated for Columbia.

All the by-passes in the larger towns along Route 61 are in the same situation. In fact, the by-pass at Sikeston, on 60-foot right of way, is now just another city street. Development along this street has been near the edge of properties. A by-pass for this by-pass is almost a necessity. On the other hand, at Cape Girardeau much of the malignant growth which started at the north end of the by-pass was stopped by widening both roadway and right of way at the south end, much as a surgeon might stop a malignant growth in a cancerous body.

Between 1914 and 1917, when the writer was a teen-ager, he was privileged to live in a county in the State of Delaware through which thirty-six miles of hard-surfaced road were built. This highway was financed with private capital and given to the state before Delaware had organized a highway department. The man in charge of the design and construction was Charles M. Upham, now a highway engineer and engineer-director of the American Road Builders Association.

Mr. Upham's location and design included by-passing six towns and acquiring 200-foot-wide rights-of-way. The foresight of this man thirty-five years ago is reflected in the fact that these by-passes were needed and are still functioning because the wide right-of-way has discouraged ribbon development. What Mr. Upham accomplished at the beginning of the highway-for-automobile era, present highway engineers with thirty-five years of hindsight and new technique should be able to accomplish in the future.

Traffic Control on Auto Race Days

JOHN H. BUNCH

Mr. Bunch is Assistant Traffic Engineer of the State Highway Commission of Indiana. He has been District Traffic Engineer and Traffic Signal Engineer. As Assistant Traffic Engineer, he has made many city traffic and parking surveys. He planned and conducted the study described in this article. Mr. Bunch is a member of the Institute of Traffic Engineers and the National Society of Professional Engineers.

THE first 500-Mile Automobile Race was held in Indianapolis in 1911. There were forty-six entrants and the winning driver averaged 74.62 M.P.H. In 1949, the race attracted sixty-five entrants, and the winning driver averaged 121.327 M.P.H. to complete the race 191 seconds before the car in second place. This grueling contest is a proving ground for the cars of tomorrow: in the 500 miles the wear on the motors is considered the equivalent of 50,000 miles of normal driving.

To this proving ground is attracted the largest crowd to attend a sporting event in this country. Devout fans regularly reserve seats a year in advance; some drive to the track days before the race, park their cars outside the gates, and sleep little or none the night before. When the gates are opened, they risk serious injury in their own race to gain a "rail-bird" position.

More people attend this race than live in any Indiana city except Indianapolis, compressed with their thousands of automobiles, into less than one-half square mile. These spectators travel in airplanes, trains, buses, trucks, taxis, and private motor cars; and because the motor car is so extensively used, this study was made.

The race track is situated in the city of Speedway, an appropriately named community of about 5,000 persons west of the approximate center of Indianapolis, separated from the larger city only by its legal boundary. Traffic from three primary directions to the track must therefore pass through, and is a major problem to, the Capital City. Parking is provided by the management in the track infield

and by private operators and home owners in lots surrounding the speedway grounds.

Because of the war, no races were run in 1942 to 1945. In 1946, therefore, when restrictions were lifted, the demand for admission was so great that entrances adequate before the war would not accommodate the crowds. Many persons with tickets previously purchased, were still trying to get in when the race ended *four hours* after it began. The gates had opened at 6 in the morning; the race started at 10.

This disorganization called for a complete reorganization of procedures. The State Highway Commission was asked to make a detailed study of road, street, and gate capacities to determine the improvements needed for such traffic volumes. A completely new method of traffic control was developed, with the Indiana State Police airplane to be used for aerial observation, their Executive Officer to act as coordinator, and radio equipped squad cars to be stationed at every important intersection. A Safety Committee composed of members from all agencies involved in this problem of transportation was organized with the Safety Director of the Speedway Corporation as Chairman.

Organization for 1947 Race

Information concerning gate and ticket-lane capacities was collected from all known sources and adjusted to local conditions. With an adjusted figure of 250–300 cars an hour for each lane for one ticket taker, it was found in the preliminary traffic study that gates used in 1946 would accommodate only 55 per cent of the road and street capacity. Thirteen additional gate lanes were then constructed and these, with the ten previously used, had an estimated capacity of 108 per cent of the total road and street capacity.

The Safety Committee then selected routes that would best serve the local traffic as well as that originating outside the city. These routes are shown in Figure 1. It will be noted in this sketch that state route traffic was to be intercepted a considerable distance from the track for better control through Indianapolis. Large banners and markers were planned for all routes.

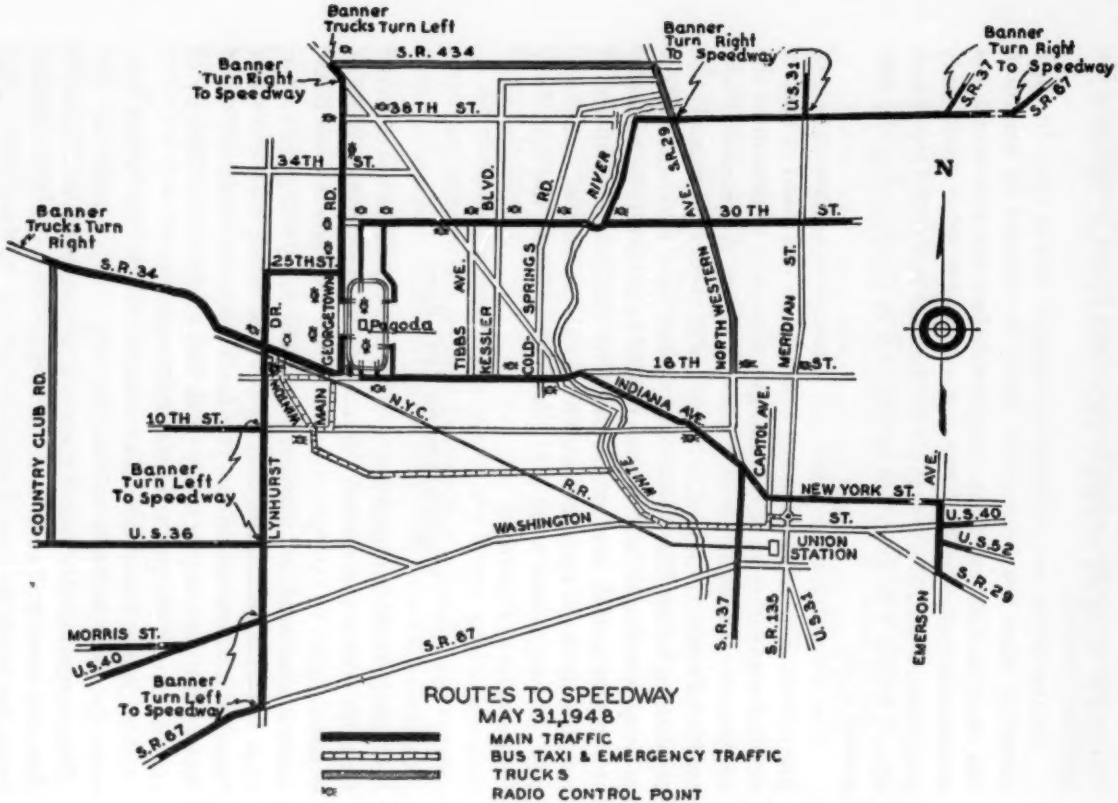


FIGURE 1. The network of routes selected for through traffic to and from the race track.

A special bus operation was arranged from downtown Indianapolis to the track. Express buses were scheduled for one-a-minute service in addition to those on regular schedule. A special route was designated with the buses traveling in a one-way loop past the unloading point.

Taxi cabs were to follow the route used by the buses. Their loads could be picked-up wherever possible and they were given their own unloading zone.

A shuttle train service was arranged from Union Station in downtown Indianapolis to the track with a schedule of approximately twenty minutes. The point of unloading was opposite gate No. 5, which was set aside for the primary use of pedestrians.

A special taxi shuttle service from the airports to the track was also arranged.

Operation on Race Day

The influx of race traffic was noted several days before the race (Figure 3) but the heavy concentration on race day was given special consideration along the routes through Indianapolis. All traffic signals were turned off and police officers directed traffic manually. The parking of early arrivals on the streets and roads immediately adjacent to the track was supervised and arranged so that general two-way traffic could be maintained until midnight. After midnight the routes became one-way for all except emergency vehicles. Wreckers were stationed at close intervals to remove all breakdowns.

The Pagoda, a six-story track-side tower used for race observation and supervision, was operation headquarters and the executive officer was in direct charge in a carefully guarded room at the top of this building. By the use of two-way radio equipment previously installed, reports were received from the traffic officers concerning conditions at the important intersections and from the observation plane, which had taken off before dawn, on parking build-up and general conditions. This information was used to outline the initial traffic pattern. The gates were opened at 4 a.m. The aerial observer then reported, periodically, the number of cars a mile on all rural highways, the heavy city movements that might cause congestion,

the extent of actual congestion, and designated routing to eliminate or reduce such interference. The traffic officers reported pertinent

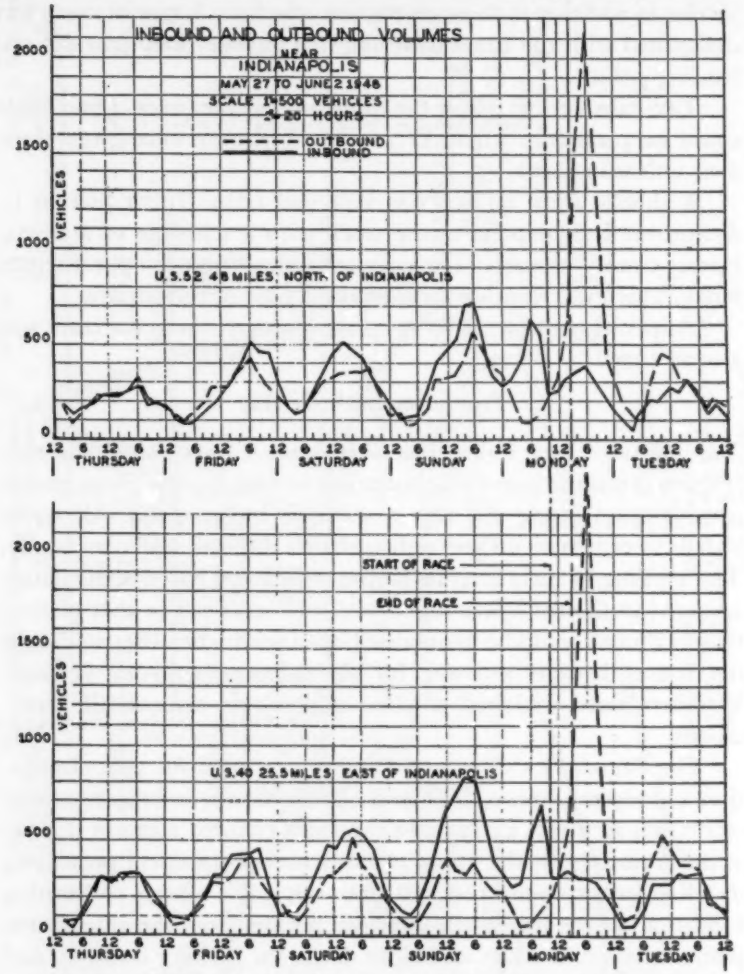


FIGURE 3. A comparison of inbound and outbound traffic on two State Roads for a period of 4 days before, on, and 1 day after the race.

information concerning their intersections and accepted orders for any necessary re-routing. In this way there was little congestion and

traffic was kept moving constantly. A log of all radio communications was recorded for future reference.

At all vehicle gates tickets were sold by several men who advanced along the line of waiting cars. The tickets were then stubbed by one ticket taker at the gate. With this method a maximum of 342 vehicles were passed through *one gate lane in one hour.*

From a central loading point in downtown Indianapolis the bus-a-minute schedule was maintained to the track. These buses made no stops enroute and when unloaded, returned immediately to the starting point. The arrangement was very efficient and, in 1948, there were 5,001 passengers transported during the maximum hour of 8:00–9:00 a.m. After the race the procedure was reversed.

Taxi-cabs accepted loads wherever found but followed the route set aside for buses. In 1948, during the same 8:00–9:00 maximum hour, there were 1,550 passengers transported by this means. The fare they charged favored a full load instead of the individual rider.

The shuttle train service started at 2:50 a.m., and the proposed 20 minute schedule was reduced to twelve minutes at peak demand. Many people parked downtown and used this service thereby eliminating some traffic and parking congestion at the track. The maximum hour was the same in 1948 for this service and 5,930 people were accommodated.

The proportionate amounts of this public transportation are shown in Figure 6.

Survey Procedure

After all arrangements had been completed for the 1947 race, a traffic survey was organized to collect information for future planning and to verify prerace estimates. This study, with some elaborations, was repeated in 1948 because of the great difference between conditions in 1946 and 1947.

Automatic portable counters were placed on all state routes which serve Indianapolis. They were located at points outside the city limits and operated several days before, during, and two days after the race. This made it possible to determine average day as well as race day traffic. In addition, permanent type counters located on U. S. 52, 48 miles north and on U. S. 40, 25 miles east

of Indianapolis were also used to compare inbound and outbound traffic on these divided lane highways.

Automatic portable counters were placed at all vehicle gates leading to the infield parking area; a sample check of license plates

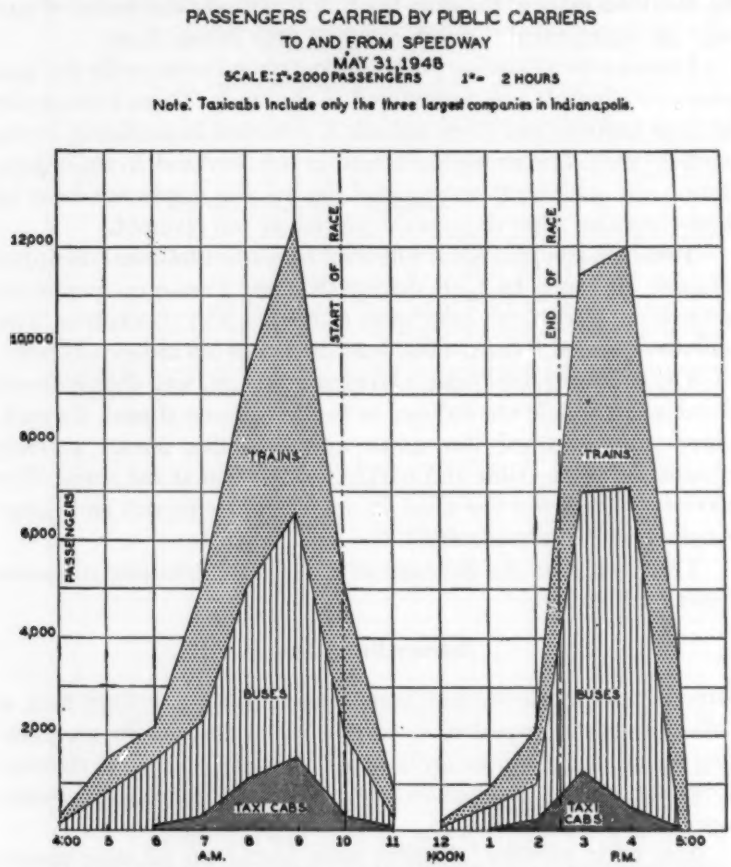


FIGURE 6. Showing comparative use of taxi-cab, bus and train transportation on race day.

to determine car origin; a car occupancy check at spot location and short, manual counts to check road capacities were other studies made. In addition, arrangements were made to secure total attend-

ance figures from the Speedway Corporation; individual and total bus passenger loadings; hourly passenger loadings from the three major taxi companies; shuttle train loadings by arrival and departure times at the track; and airport traffic figures.

Survey Findings, Discussion, Results

In 1937, a study of race day traffic volumes was made on all state routes entering Indianapolis. This data will also be used for comparison with that secured in 1947–1948 to portray general conditions and is presented in Table 1 which follows:

Table 1

TRAFFIC VOLUMES COMPARED BY YEARS

	% Increase Over Preceding Year		*% Increase For Race Day Over Average Day*
Year	*Average Day*	*Race Day*	
1937	—	—	92%
1947	31%	12%	64%
1948	29%	23%	56%

Traffic volumes on individual routes for average day and race day were secured with the automatic counters. A comparison of this data is shown in Figure 2. In both 1947 and 1948 the number of cars driven to the race approximated 50 per cent of all the traffic recorded by the portable counters on race day. While many of these made the round trip in one day, there were many others which arrived in Indianapolis before the day of the race. This is shown in Figure 3.

A more detailed variation of the volumes on race day is shown in Figure 4, which is a comparison by fifteen-minute intervals, of the traffic on two state routes and at two major track gates. The arrival of many cars at the track before race day is also clearly indicated by the gate volumes immediately after they were opened. This will be noted in Figure 4 and in the actual hourly totals and percentages given in Table 2.

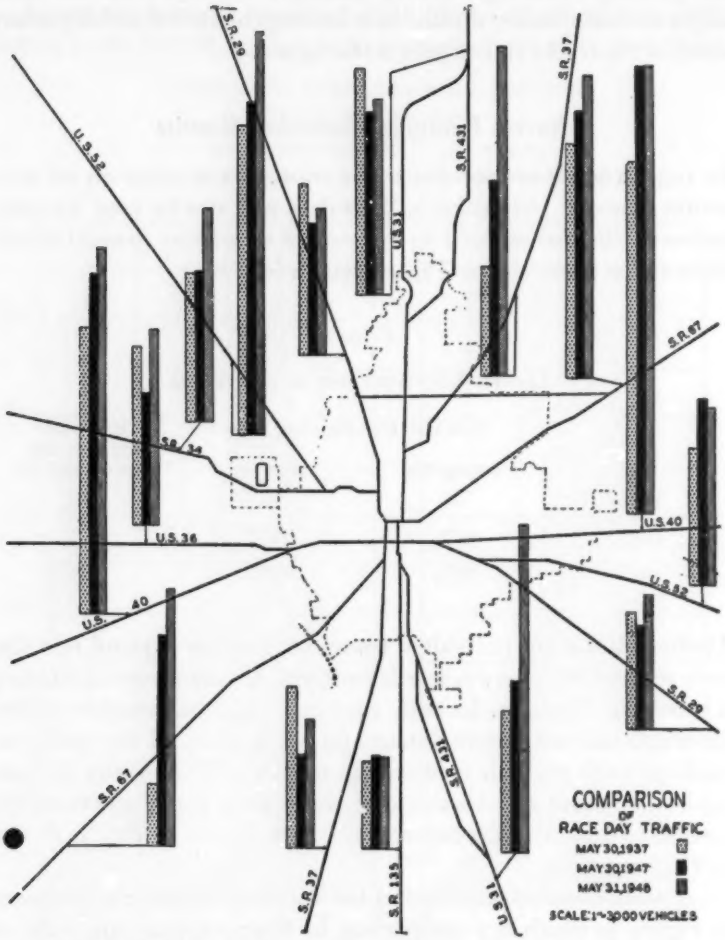


FIGURE 2. Showing race day traffic for the years of 1937, 1947, and 1948 for all State Routes leading into Indianapolis.

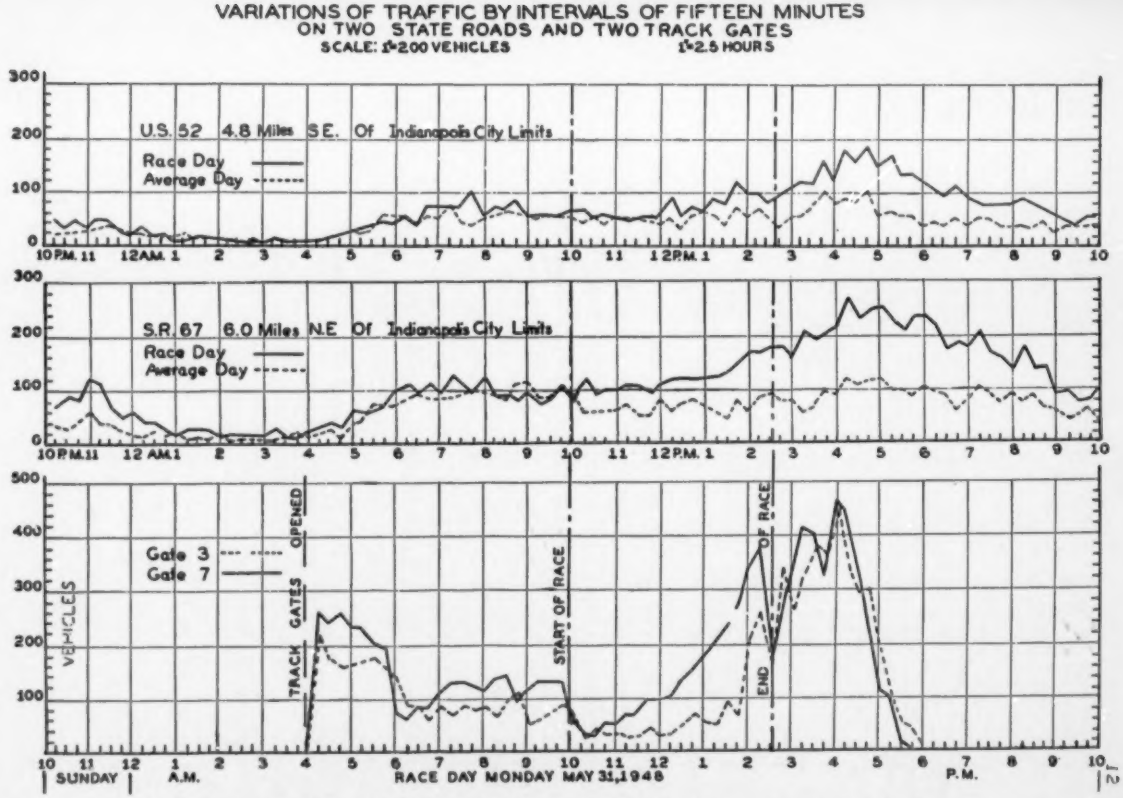

VARIATIONS OF TRAFFIC BY INTERVALS OF FIFTEEN MINUTES
ON TWO STATE ROADS AND TWO TRACK GATES
SCALE: 1"=200 VEHICLES
1"=2.5 HOURS
U.S. 52 4.8 Miles S.E. Of Indianapolis City Limits
Race Day
Average Day
S.R. 67 6.0 Miles N.E. Of Indianapolis City Limits
Race Day
Average Day
Gate 3
Gate 7
VEHICLES
TRACK GATES OPENED
START OF RACE
END OF RACE
10 P.M. 11 12 A.M. 1 2 3 4 5 6 7 8 9 10 11 12 P.M. 1 2 3 4 5 6 7 8 9 10
SUNDAY
A.M.
RACE DAY MONDAY MAY 31, 1948
P.M.

FIGURE 4. Variations of traffic on two State Roads and at two track gates by 15 minute intervals for a period 12 hours before to 12 hours after the race started.

Table 2

CARS ENTERING SPEEDWAY INFIELD

	1947			1948		
Hour A.M.	*Number Entering Infield*	*% of Total Entering*	*% of Total Gate Capacity*	*Number Entering Infield*	*% of Total Entering*	*% of Total Gate Capacity*
4–5	4433	28	70	6214	31	97
5–6	4548	28	70	4900	24	77
6–7	2427	15	38	2188	11	33
7–8	2152	13	34	2685	13	42
8–9	1724	11	27	2557	13	40
9–10	771	5	12	1360	7	21
After 10	45	0		292	1	
Total	16100	100		20196	100	

The data on road and gate capacities was very effectively used by the Safety Committee. This original planning, plus the shifting of traffic on the streets in the track vicinity, brought street and gate capacities and use into good balance. This will be noted in Table 3. Major congestion was entirely eliminated and entrance to the track made easy.

Table 3

TRAFFIC TO SPEEDWAY INFIELD PROPORTIONED IN REFERENCE TO FEEDER SYSTEM

Road	*% of Total Road Capacity*	*% of Total Gate Capacity*	*% of Vehicles Entering Infield*	*Gates*
16th St. E. of Gate 4	46	38	37	1, 3, & 4
Georgetown Rd. S. of Gate 6	16	17	13	6
Georgetown Rd. N. of Gate 7	18	17	23	7
30th St. E. of Gate 10	20	28	22	10 & 11
			5	5*
Total	100	100	100	

* Gate 5 is intended to be primarily a pedestrian gate.

The study of traffic origin, as determined by the check of license plates, revealed that 43 per cent of infield cars were from Indiana; 43 per cent were from the four states adjoining, and 14 per cent from the rest of the country.

The car occupancy check showed an average of 3.71 passengers per vehicle in 1947 and 3.27 passengers per vehicle in 1948. Some of the vehicle volume increase in 1948 is due to car occupancy decrease.

After total attendance and actual bus, taxi, and shuttle train loadings were known, the total for private transportation was computed. These proportionate volumes are shown in Figure 5. Al-

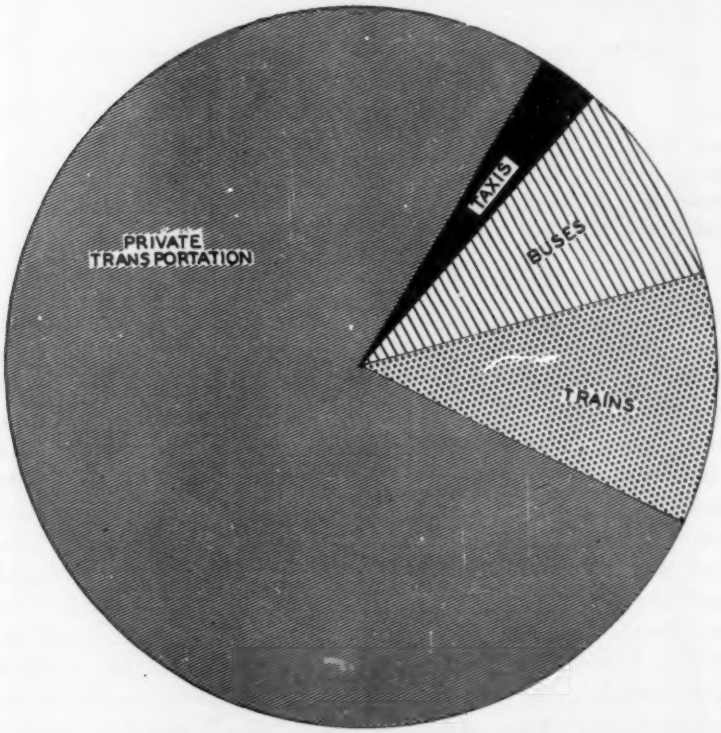


FIGURE 5. Race attendance proportioned according to means of transportation.

though total parking in the infield is known, accurate figures for parking in private lots and on the streets of Speedway City could not be obtained.

A further breakdown of public transportation is shown in Figure 6. While approximately 39,000 people used this means to get to the track, the return load for each was less because many riders returned with friends in private cars.

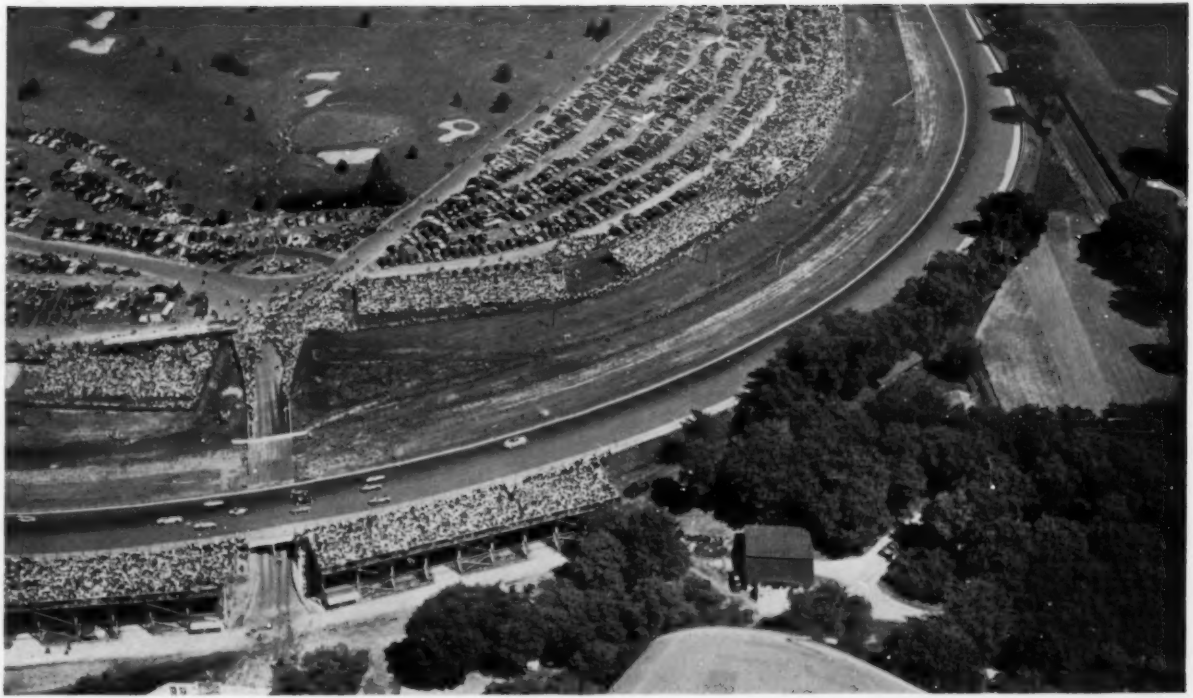
After the studies of 1947 and 1948, the road and gate capacities were revised to fit actual race conditions. These appear in Table 4, and Table 5. They are not to be interpreted as maximum capacities, but as average figures which can be maintained under the conditions that exist.

Table 4

REVISED VOLUME CAPACITY OF STREETS ADJACENT TO SPEEDWAY

Street	*Number of Lanes*	*Capacity in Vehicles per Hour*
16th St. E. of Gate 4	4	4000
Georgetown Rd. S. of Gate 6	2	1400
Georgetown Rd. N. of Gate 7	2	1600
30th St. E. of Gate 10	2	1700
Total	10	8700

For purposes of comparison, 16th Street is a thirty-foot street, divided into two normal lanes, with rock asphalt surface and wide shoulders. Under the pressure of heavy traffic on race day it is used by four lanes of traffic moving in one direction. For one fifteen-minute period it operated at the rate of 4,568 cars an hour or 1,142 a lane. The Georgetown Road south of Gate No. 6 is a two lane road with a bituminous macadam surface, 18 feet in width and having narrow shoulders. The volume control factor here is a concrete arch bridge with a 16 foot roadway. The Georgetown Road north of Gate No. 7 is also a two lane road 18 feet wide with narrow shoulders. Thirtieth Street is another two lane thoroughfare with an 18 foot bituminous surface and narrow shoulders. The control factor here is a steel truss bridge with a roadway *16 feet* in width and short approaches on a 6 per cent grade. This bridge had an original estimated capacity of 1,440 vehicles per hour when travel-



GATE 3

Airview of Track, Parking, and Approaches.

ing in a *single lane,* but by actual count of vehicles running in *two lanes* and in staggered and abreast positions, the maximum usage was at the rate of 1,714 vehicles per hour, or 857 per lane.

Table 5

REVISED ESTIMATES OF GATE CAPACITIES

Gate	*Kind of Track Crossing*	*Number of Gate Lanes*	*Total Gate Capacity in Vehicles per hour*
1	2 Surface Lanes	3	800
3	2 Tunnel Lanes	3	800
4	2 Surface Lanes	3	800
6	2 Tunnel Lanes 2 Surface Lanes	4	1100
7	2 Tunnel Lanes 2 Surface Lanes	4	1100
10	2 Surface Lanes	3	900
11	2 Surface Lanes	3	900
Total		23	6400

In 1947 and 1948 the maximum outbound discharge from the infield was at the rate of 6,100 vehicles per hour. With 4,130 vehicles using the tunnels to leave before the end of the 1947 race it required two hours for all others to leave, while 3,380 vehicles used the tunnels in a like manner in 1948 and it required two hours and forty-five minutes to clear the infield after the race.

Conclusions

The problem of providing access to the grounds of the Indianapolis Motor Speedway has been solved. All cars which were parked on the streets were admitted before 7:30 a.m., in 1947, and before 7:10 a.m., in 1948. Cars which arrived after these times were passed immediately through the gates.

The problem of egress is yet to be solved. Whereas the flow of racebound traffic is spread over many hours and total street and road capacity is not used, there is not, and will never be, sufficient

space to let every one leave, as he so desires, immediately after the race is over. Maximum capacities are reached during this outbound rush of three hours duration and there is congestion on the streets and at the intersections.

A concentration of attention applied to the problem can shorten the duration of this congestion to the limitations of capacities, but it would be extremely difficult to make improvements which would equal those made for inbound traffic.

The People Banned Parking Meters in North Dakota

J. ADIN MANN

Mr. Mann is vice-president of Mann's department store in Devils Lake, North Dakota. He is a member of the Devils Lake City Commission and vice-president of the League of North Dakota Municipalities. When an initiated law was introduced that would outlaw parking meters in North Dakota in 1948, he was appointed chairman of the State Municipal Rights Committee and conducted a spirited campaign to retain the meters. He is also a member of the National Municipal League.

ON JUNE 29th Parking Meters were outlawed in the state of North Dakota by the narrow margin of 2500 votes cast by the people of the state who approved the following initiated act:

"An act making it unlawful for the state of North Dakota, its political subdivisions, counties, cities, villages and the State Highway Department, to establish and maintain any devices known as "Parking Meters," or by whatever name designated, requiring the deposit of coins or tokens therein for the privilege of parking cars or other vehicles upon the streets and highways in the State of North Dakota, and declaring void any existing ordinance or resolution authorizing the use of such devices."

The act was instigated by a citizen who disagreed with principles involved in the use of meters in the city of Minot. Streets should be free to everyone, he contended, and everyone should take his own chances on securing parking space and to control his own traffic.

Parking meters were new to Minot, and in their zeal to enforce the unfamiliar meters, over 25,000 tickets had been issued to violators in the first year. On the other hand Minot had a serious traffic problem and the meters were the best means that had been devised to take care of the problem. Other cities in the state were probably having the same problem of educating the motoring public to accept meters but in Minot the trouble came to a head.

Initiated measures are fairly simple to originate and get on the ballots in North Dakota. Ten thousand signatures of qualified voters are all that is required to file the measure with the state department. The measure is then placed upon the ballot of the next general state election. Consider that the city of Minot alone had issued 25,000 meter violation tickets to a public "uneducated on their use." Yet the initiated measure carried 25,000 signatures from all over the state.

The nine meter towns went on the offensive immediately as they were all convinced that the act was an invasion of their municipal rights. Regardless of the known value of meters in the regulation of traffic and for revenue, the meter cities felt that the general electorate of the entire state, many of whom were not and perhaps never would be regulated by meters, were not qualified to deny the right of individual cities to regulate their own traffic. Therefore the Municipal Rights Committee was organized.

From the start it was predicted that we would lose the election by at least 60,000 votes. There had been over 150,000 violation tickets issued in the state in the past several years. The Municipal Rights Committee decided upon a two-barreled program of education, an appeal directly to the users and non-users of parking meters themselves. We would first sell the voter on the benefit the shopper gets from parking meters, and second on the fact that their banning would invade Municipal Rights.

The campaign was to be costly and the first job was to raise money. The meter cities were handicapped in that, according to law, they were not able to contribute directly to the defense fund. There was nothing to prevent them from telling the advantages of the meters locally as long as their advertising was not political, and they were allowed to hire legal counsel for the court fight. Chambers of Commerce, Parking Meter Companies, and interested citizens contributed to the fund.

Voters were told that the meters gave shoppers coming to town the following services:

1. Police protection against pilfering.

Cities which have had parking meters for a while have noticed

practically non-existence of pilfering from cars and no car thefts. The fact that a patrolman makes regular rounds and observes not only the meter but the car, is worth meter charges.

2. The parker receives protection against traffic accidents and dented cars due to improper parking.

The meter regulates careful parking. There is plenty of room between cars. No double-parking. Motorists are more careful in backing from parking places and in driving in.

3. The parker is assured a preferred parking place before he even comes into town.

The meter eliminates the inconsiderate parker both from city and out-of-town who will monopolize parking places in spaces where there are no meters.

4. Parking coins work for the parker in improving parking conditions and a better shopping center.

Parking meter revenues are being used by the town to provide free parking lots, snow removal for motorists' convenience, a better city for your shopping needs, and improved streets.

"Parking meters are your guarantee of the above services. Cities provide many free parking spaces off the main congested areas. The meters are for your convenience. If you do not believe in using them there are many free parking places: but do not by your vote deny the use of parking meters to thousands of meter users who are sold on the idea that they do solve their parking problems."

The campaign was dramatized by declaring a state-wide moratorium of a week on parking meters. A special cloth hood was placed over the meter heads with the slogan printed thereon, "Vote For the Meters." The result of this week's trial of the old system of traffic control was enlightening. Traffic on the streets was snarled, parking places were filled from morning until night by parking hogs, motorists fought for a place to park . . . those not in favor of the meters, as well as those favoring, had to park out from the central shopping areas.

By air, by circular letters, by advertising in all the state's newspapers the value of parking meters was spread. Those who sponsored the Meter Ban measure did nothing in the way of advertising. They

obtained some publicity in utterances of the sponsor of the anti-meter bill. But not much advertising was necessary. Those 150,000 violation tickets were a big asset.

Political action also was a factor. A farmer publication in the state came out three weeks before the election with an advertisement and editorial arguing that the streets should be free, that the cities were reaping an exorbitant profit from the meters. The meter cities tried to avoid any semblance of a city-country fight and countered by repeating that parking coins were put to work for rural people, that no one was compelled to use parking meters, that meters were installed for the benefit of rural people.

There seemed to be no middle ground in the controversy. No one was neutral. Citizens were either rabidly for or rabidly against the meters. There were many rural supporters of the meters who realized the value to themselves. But there were many rural people against the meters who believed they need not help pay for city improvements, and that they should not be regulated in any way.

People generally do not want to be regulated, even though they know it is for their own good sometimes. County newspapers of the state were generally neutral. A few ran editorials against the meters, a few commented for. Some of the smaller town newspapers thought the matter should be left to the meter cities to decide, others that the meters were "one-armed bandits."

But despite all of the efforts to retain meters by education when the votes were counted 94,000 people had voted *for* the Meter Ban and 91,500 voted against it. Many rural communities voiced their disapproval of the meters strongly, others were in favor, many were about equal. Some meter towns carried their surrounding territory, others were badly beaten. For days, the outcome was in doubt, until votes from outlying communities were counted.

The Municipal Rights Committee met shortly after the election to decide on future action. Because the vote had been so close, the Committee felt that the fight should go on. Another two-pronged program was worked out. First, a firm of lawyers was retained to carry on a legal fight to have the Meter Ban outlawed as unconstitutional. Second, an initiated measure to repeal the Meter Ban would be put on the fall ballots.

The first act in the legal battle was to obtain a temporary injunction, enjoining the enforcement of the law banning meters on the grounds of unconstitutionality. Plaintiffs in the action were the cities of Fargo, Bismarck, Dickinson, Grafton, Jamestown, Devils Lake, Grand Forks, Minot and Whapeton, the meter company, and a Fargo businessman. Defendants were the attorney general and the states attorneys of the nine counties affected.

The complaint maintained that the initiated measure was invalid and void in that it violated provisions of the state and federal constitutions, including the fifth and 14th amendments and commerce clause of the U. S. constitution.

The complaint listed these specific objections to the initiated parking meter ban:

"It is unreasonable, arbitrary, oppressive and capricious.

"Its operation will not in any degree prevent an offense or evil, or preserve public health, morals, safety or welfare, and has no real or substantial relation to these objects.

"It denies the right to carry on a lawful business in a lawful manner.

"It takes and destroys property and property rights without just cause or reason.

"It prevents the use and sale in North Dakota of a legitimate article without any lawful reason, and unreasonably burdens interstate commerce.

"It increases the tax burden of plaintiff Hoenck and other tax payers similarly situated, and restricts and hampers their use of their property.

"It selects a means of regulation . . . an absolute banning of the use of parking meters . . . which has no real or substantial relation to any known object sought to be obtained, and is an invasion of the plaintiffs' rights secured by fundamental law.

"It embraces more than one subject.

"It takes or damages private property for public use without just compensation.

"It amends existing laws by reference only.

"It repeals and makes void ordinances by reference only.

"The act is broader than its title.

"The act is not legislative but executive and not a proper subject for an initiative measure."

The plaintiffs further alleged that no ordinance or resolution now in effect in any of the municipalities concerned provides for the deposit of coins in meters for the privilege of parking cars, but that meters are required so that traffic generally can be regulated and the proceeds are used to defray expense of regulating traffic and use of the streets.

Prohibition of meters, the complaint stated, will greatly interfere with successful and satisfactory control of parking and traffic, and will compel the municipal plaintiffs to spend many thousands of dollars for the hiring of additional policemen.

According to the complaint, prohibition of meters will also:

"Prevent efficient traffic regulation by producing congestion and accidents; increase the amount of taxes paid by one of the plaintiffs and other taxpayers similarly situated, will seriously interfere with the successful conduct of their businesses; destroy the legitimate business of the Park-O-Meter Company [one of the plaintiffs] in the state; almost wholly destroy and sacrifice the investment made by the municipal plaintiffs, as the sale of parking meters will be difficult and almost impossible to make at a price over and above the cost of their removal from the streets."

The complaint claimed Fargo has an investment of more than $76,000 in parking meters; Bismarck $31,000; Devils Lake $18,000; Dickinson $29,000; Grafton $13,000; Grand Forks $30,000; Jamestown $26,000; Whapeton $9,000 and Minot $43,000.

The next step came from the attorney general. He asked the district court at Fargo to dissolve the temporary injunction. He filed a demurrer, challenging the legality of the injunction. He contended that many allegations in the complaint on which the injunction was based were without substantial basis for declaring the law banning meters unconstitutional. He said the complaint and affidavit in the action did not present sufficient grounds for warranting the court to issue a temporary injunction. The attorney general also took issue with the complaint relative to damage or injury to property because of the law. He also claimed the injunction order in direct violation

of the North Dakota code in that it prevents the execution of a public statute by officers of the law for the public benefit.

The next day the court overruled the demurrer declaring that the complaint does state a cause of action. The attorney general then had two choices. He could answer the complaint; in which case a trial would be held and testimony taken, or he could stand on his demurrer and refuse to plead further.

If he stood on his demurrer, then the court would order a judgment declaring the initiated act unconstitutional. He chose the latter and on September 29th, Judge John C. Pollock in Cass district court declared the initiated measure prohibiting use of parking meters in North Dakota unconstitutional and void.

Further Judge Pollock signed a judgment permanently restraining the attorney general and states attorney of affected counties from enforcing the provisions of the measure.

In written and oral arguments during the court test, attorneys for the plaintiffs contended the probable evil aimed at by proponents of the initiated measure was the making of a charge for the use of streets. He said the measure did not correct or cure this even if it be assumed such a charge was an evil and not for the public good; that the marked tire means of enforcing traffic parking would have to be used. The attorneys argued further that the measure outlawed the use of a mechanical policeman and that cities were still free to make a charge for parking. He claimed that all the measure does is to make the job of controlling traffic in cities more difficult and more expensive.

In the meantime meter cities were divided on their opinion as to the operation of their meters. Under the injunction it was legal but hard to enforce the collection of parking nickels. Some meter cities took the heads from the meters when the law went into effect on July 30th; others continued under the injunction trying to enforce their meter ordinances. Many motorists voluntarily put in their parking coins and used their meters as the means of recording their parking time and because they believed in the meters.

It was a jumbled situation. Parking conditions in the cities not using the meters rapidly deteriorated because of the fact that no

ordinance other than the meter ordinance was in effect to care for any other method of enforcement. The headless meters stood forlorn and lonely.

It was comparatively easy to secure 12,000 signatures to the initiated measure calling for a repeal of the Meter Ban. The Municipal Rights Committee began work on the fall campaign with little enthusiasm and almost no hope of succeeding. Advertisements in all weekly newspapers and vigorous campaigns in all dailies were carried on, as well as radio programs. Almost without exception it has been the practice for North Dakota voters to vote down all repeal measures and the present one was no exception. While the Municipal Rights Committee held 90,000 of the votes cast for meters in the spring, additional voters in the bigger election threw their weight on the other side and the repeal measure was snowed under by 20,000 votes.

On September 29th the Attorney General had appealed to the State Supreme Court and their decision was withheld on the constitutionality of the act until after the November elections. If the Repeal had won out the Supreme Court would not have had to render a decision. As it was the case was put on their calendar. Now all but two North Dakota Meter Cities had removed the meter heads and these two were not enforcing their ordinance. Cities went back to the stone age method of marking tires in an attempt to limit parking time.

On January 27th five months after the meters were legally declared illegal the State Supreme Court announced their decision. Here is the shortened form stated by the Associated Press.

Bismarck (AP) —Constitutionality of the parking meter ban was upheld today by the North Dakota Supreme Court in a 4–1 decision. The action outlawed use of meters in the state.

Justice James Morris dissented, holding that an error in the ballot title rendered the prohibition voted at the time June 29 primary election, void.

The majority, however, agreed that despite the ballot-title error, the voters were not misled, and that to void the prohibition on such grounds would be in effect, unlawful disenfranchisement of the people.

And here the battle to retain meters in North Dakota rests

banned by the will of the majority of the people and upheld by the supreme court. It should be enough authority to discourage Municipal Rights in the managing of traffic problems in the state for years to come. It does point up how outmoded and inefficient the old method of controlling traffic has become.

From our experience here in North Dakota meter cities have drawn the following conclusions:

Even though by a small majority, motorists have voiced their objection to parking meters and outlawed them in North Dakota they are the best means yet devised of controlling traffic and obtaining needed revenue for the improvement of parking facilities.

Parking meters must be administered in a firm but not arbitrary manner. The motoring public must be sold on their advantages. Free parking must be furnished and not too many meters installed. If motorists, especially from rural communities, have the idea that municipalities are using the meters for revenue purposes only . . . look out.

Strangely enough, since our meters have gone out we've had many comments by rural people, particularly, on how much they liked the meters. We believe that all those who were using meters consistently before the ban were perfectly satisfied that they were paying for a definite service. If our meters had been allowed to operate for a longer period of time so that the people of the state could have been better informed as to their advantages we would still have had the meters. We are rugged individualists in North Dakota.

Trends in State Traffic Legislation

ASSEMBLYMAN HAROLD C. OSTERTAG

Assemblyman C. Ostertag, has been a member of New York State's Assembly since 1932, and chairman of the Legislature's Joint Legislative Committee on Interstate Cooperation since 1936. He has pioneered in the interstate cooperation movement now embracing every state. He has been a member of the Board of Managers of the Council of State Governments since 1936; a member of the Council's Committee on State-Local Relations, its Post-war Committee on Reconstruction and Development, and its Drafting Committee, a committee that drafts model legislation for the consideration of all states through their Commissions on Interstate Cooperation. He has also served on the Interstate Commission on the Delaware River Basin and is now New York's representative, designated by the Governor, on the Interstate Oil Compact Commission. As chairman of New York's Joint Legislative Committee on Interstate Cooperation, he has been active in initiating conferences among the states of the East on motor vehicle and highway problems, social welfare and relief, migratory farm labor, and commerce and economic development. Assemblyman Ostertag, active also in intrastate affairs, has sponsored legislation in social welfare, veterans affairs, forestry, pollution abatement.

DESPITE the all-too-obvious risks of prophesy I am going to predict trends in state traffic legislation. The second half of our century I believe will see an accelerated move toward uniformity in traffic laws among the states, and a measurable reduction in the conflicting laws and regulations that now confuse the motorist.

Developments point strongly in that direction. My own observations and experience as chairman of the Northeastern Regional Motor Vehicle and Highway Conference reinforce that view.

In this area, perhaps the most significant recent occurrence among the states was the action of the 1949 Governors' Conference. This action directed that the Council of State Governments, "in cooperation with agencies active in this field, prepare suggested state legislation designed to accomplish uniformity among the states with

respect to those items of traffic control, highway markings, signals and rules of the road which are considered to be of major importance or immediate urgency."

The Council now is making necessary studies preliminary to forming such a program, and in all likelihood will channel it through the states' commissions or committees on interstate cooperation to the 1951 session of the state legislatures.

Meanwhile, the Council has already included in its program for this year a Model School Bus Act designed to bring about interstate uniformity in the regulation of school busses.

In addition to these concrete steps, the Council of State Governments is activating regional motor vehicle conferences in many sections of the country, similar to the Northeastern Conference, to iron out interstate conflicts, and it is safe to anticipate that these conferences, like the Northeastern Conference, will correlate their programs with that of the Governors' Conference, so that there will be a concerted and coordinated effort among the states in the direction of uniformity.

A Review of Achievements

In order to illustrate the progress that can be made through these mechanisms, let me review the achievements that have been made among the states of the Northeast through our Regional Highway and Motor Vehicle Conference.

Annually for the past fourteen years, New York's Joint Legislative Committee on Interstate Cooperation has sponsored these conferences. The objective has been to encourage uniformity in motor vehicle and traffic regulations.

The conference brings together highway and motor vehicle administrators and others concerned with the use of our highways, and legislative members of the committees or commissions on interstate cooperation from all the states of the region. Thus, its obvious and great value is that it brings together the officials who are living with the problems created by lack of uniformity and the men who are in a position to do something about it.

Conferees discuss the states' existing and developing motor vehicle and traffic problems, particularly those created by or resulting

from lack of uniformity, and recommend corrective uniform programs in many fields, to which the states are invited to conform.

While the conference has, of course, no power of compulsion behind it, the fact that its recommendations grow out of the joint deliberations of state administrators and state legislators lends authority to them and the record shows that measurable progress has been made among the states of the region in securing their adoption.

In the interim between these annual conferences, which are customarily held in New York City, regional continuing committees composed of legislators and administrators study unresolved or developing problems in their assigned areas and prepare reports and recommendations for the consideration of the next conference. Thus the recommended conference program is not static, but is subject to revision and modification over the years, as the people who are living with these problems determine that new conditions require new laws or regulations.

In citing the areas in which substantial progress toward uniformity has been made, I am aware that the list will probably bring no satisfaction to the average motorist's heart. A lack of uniformity may raise his blood pressure but the correction of that situation does not. In general, I think he regards uniformity as a norm, and is aroused only by deviations from it.

Yet it is important to remember that lack of uniformity, where it occurs, is often traceable to unresolved automotive or highway engineering or construction problems and is not due to the perverseness of local officials or the ignorance of lawmakers. At all levels of government today there is recognition of the desirability of as great a degree of uniformity in motor vehicle and traffic laws and regulations as possible; but it is self-evident that uniformity in the control of 44,000,000 motor vehicles operating over several million miles of roads on all kinds of terrain is not only impossible of achievement but probably undesirable.

There will always be variations dictated by local topographical and other conditions. Moreover, in an area as broad as automotive and highway engineering and construction, where there is a continuing premium on innovations, there must always be elbow room for experimentation with new kinds of controls, legislative or

administrative, which appear to be in the public interest. Meanwhile, the fact of continuing innovations makes a legislative or regulatory time-lag inevitable, particularly in the achievement of interstate uniformity. Nevertheless, in a great many areas substantial uniformity is clearly desirable. In these the states of the Northeast have worked together with substantial achievement.

Conditions in 1936

To point up the progress, let me review conditions existing when the first Northeastern Regional Conference was called in 1936. The conference was primarily concerned with highway safety—a subject which is still Number One on our agenda. An analysis of the laws bearing on the subject in the states of the region at that time showed the widest variation as to safety regulations. In some cases there was a complete lack of regulations. For example, maximum weights for motor trucks, including loads, varied from 23,000 pounds in one state to 36,000 pounds in another. Maximum specified heights for trucks, including load, varied from 12 feet 6 inches in three states to 14 feet 6 inches in one state, while three states of the region had no regulations on this field. There was no uniformity whatever in the requirements for lighting equipment on trucks, other than headlights and rear lights.

Mechanical Turn and Stop signals were only beginning to be widely installed on cars, but there was the greatest diversity among the states with regard to hand signals. One New England state had no laws on the subject, and four others merely required audible or visible signals to indicate the driver's intention, without designating what such signals should be.

In the ensuing years, the conference arrived at substantial agreement on these problems and many others, and the state officials have pressed in their various states for the enactment of their recommendations into law.

Here is the record of the conference achievements, as of November, 1949:

As a result of the work of the Regional Continuing Committee on Motor Vehicle Problems, under the leadership of Thomas N.

Boate, a flooring on permissible sizes and weights of motor trucks and trailers has been agreed upon and is now accepted by law in every state of the region. Seven of the ten states of the region comply with the conference recommendations as to regulations governing the transportation of flammables. (It should be noted, however, that this is one area where the recommendations have been revised after several years' study because of new developments in automotive construction and new regulations by the Interstate Commerce Commission which necessarily affect the states' laws in this field.)

Every state complies with the recommendations concerning the use of emergency road flares. Seven are in compliance with the conference recommendations as to lights on motor vehicles; and eight—all but two—have laws requiring periodic inspection of motor vehicles.

In 1948 the Conference's Regional Continuing Committee on Motor Vehicle Problems recommended that the conference press for uniformity of truck registration regulations and reciprocity in the motor world. As yet no action has been taken on the recommendations as to reciprocity in registration, and only two states conform to the recommendations as to motor truck registration. On the basis of its achievements in other areas, however, there is every reason to believe that these admittedly tough nuts will ultimately crack under the continuous pressure which the conference, over the years, exerts.

Meanwhile, in the matter of school bus laws, as indicated above, the conference has rolled up an impressive record of uniform action among the states of the region. The Conference's Regional Continuing Committee on Uniform School Bus Laws under the chairmanship of Maurice Osborne, of the New York State Education Department, has had five objectives: namely, to obtain uniformity in school bus passing laws, in school bus color, in the matter of mechanical inspection of school buses, in school bus driver training programs and in uniform construction standards.

At the 1949 conference, the chairman of the School Bus Committee reported with regard to school bus passing laws, that seven out of the ten states of the region now conform to the conference recommendation that drivers be required to stop and stay stopped when approaching a standing school bus from either direction. All

of the states of the region comply with the recommendation as to school bus color, which, the conference agreed, should be uniformly National School Bus Chrome.

All states comply with the conference recommendations as to mechanical inspection of school buses and uniform construction standards. The only conference recommendation stemming from this committee which has not been widely adopted is that concerning school bus driver training programs. Only three states have established such programs along the lines of the conference recommendations, although several others are developing programs.

The conference has further devoted extensive efforts to achieve uniformity in the matter of traffic regulation and control, and much of its success in this area can be attributed to the wise and unremitting effort of the chairman of its Regional Continuing Committee in this field, Mr. R. C. Georger, Chairman of the New York State Traffic Commission.

Under his able guidance, uniform standards for pavement markings in the region have been developed, and they are widely, though not universally followed. So, too, there have been adopted by the conference a set of principles governing the regulation of speed on highways, and these principles have also been widely adopted and incorporated in the laws of the northeastern states.

Still another and comparatively-new committee of the conference under Dr. Paul Cressman of the Pennsylvania Department of Education is working out a program of safety education for the region, and the principles embodied in that program will almost certainly one day find wide acceptance.

Efforts are also being made through the conference to encourage the development of state safety programs and the coordination of these efforts among the states of the region, and here, too, marked progress has been made.

This is by no means a comprehensive review of the activities and efforts of the conference, but it will indicate, I hope, what can be accomplished in this highly important field, if continuous effort is applied. The conference, let me reiterate, has no authority to implement its recommendations. It can only determine, on the basis of the free give-and-take of open discussions, what would appear to

be the soundest course for the states to take in developing uniform traffic laws and regulations, and then urge the legislatures and administrators back home to adopt these measures. The strength of the interstate conference—and indeed the strength of the whole interstate cooperation movement in all the many fields where it operates—is that both legislators and administrators are parties to the deliberations, and, once they agree upon a program, they have an equal stake in seeing it carried out.

Some of the conference recommendations have failed of adoption in some of the states because of the seeming difficulty of implementing them. When they were first formulated, ten or fifteen years ago, the problems of implementation appeared formidable and nothing was done. Today, with the number of motor vehicles on our highways multiplied several times over, the problems are insurmountable.

This situation in the northeast may well provide a valuable lesson for other sections of the country where vehicular traffic is not yet so heavy and lend impetus to adoption of the program of uniformity which the Council of State Governments is now formulating. For if the states do not take action in this direction in the next few years, the problems may and can become almost insoluble at the state level because of the sheer magnitude of our task. If then the federal government steps in, it may supply answers which, even if feasible, will be supplied at a staggering cost. This perhaps is a negative consideration but it is an important one.

One other factor will exercise a positive influence in the direction of uniform legislation among the states, I believe, and that is the safety factor. The record shows that our achievements in the direction of uniformity have paid dividends in this area. Year after year the states of the Northeast have shown a better safety record than states in other parts of the country which have put no such concentrated and coordinated effort into uniform motor vehicle laws and programs. Thus in the first seven months of 1949, the nationwide average was 6.8 fatalities for every 100,000,000 miles traveled, according to the National Safety Council. The rate in every one of the states of the Northeast fell below that national average, and in most of these states it was several points below. Aside

from the incalculable saving that means in terms of human lives and suffering, it represents a highly calculable dollar-and-cents gain for the region. And even though the basis upon which these figures are compiled has occasionally been challenged, the record is sufficiently consistent over the years to prove, I believe, that a concerted effort among the states in the direction of uniform motor vehicle and traffic laws will save both lives and money.

For positive as well as negative reasons, therefore, the pressures in and among the states in the next few years will be in the direction of greater uniformity; and meanwhile the mechanisms for achieving it are at hand in the Commissions and Committees on Interstate Cooperation, the Governors' Conference and the Council of State Governments. The task will not be accomplished without effort. Someone once observed that salvation is an individual job, multiplied a billion times. Just so, uniformity in state traffic legislation, will be achieved only through individual, collective, and coordinated efforts among administrators and lawmakers first within and then among the states. Given this, plus active informed and continuing support from collateral public and private agencies in the field, we may look forward, I believe, to real progress in the next few years.

City-owned Parking Lot Experience in Miami Beach, Florida

CHARLES S. LE CRAW
Traffic Engineer, Eno Foundation

BEACH facilities and shopping in the tourist season swell Miami Beach's normal population of 30,000 to 150,000. In winter months an estimated 100,000 cars a day come to Miami Beach over the three causeways from Miami—jamming 250,000 persons into some 4000 acres.

This creates a serious traffic situation and a major problem of adequate parking facilities. Two types of parkers primarily are involved:

1. *Shoppers*
   Lincoln Road perpendicular to the beach provides a high type shopping center.
2. *Recreation-seekers*
   Excellent beach facilities create a parking demand comparable to worker parkers in an average city. Many persons wish to park all day near the beaches.

City officials recognized that private enterprise could not profitably supply the parking spaces needed. High land values and the seasonal aspect of the parking demand were the principal deterrents to a successful private enterprise program.

Accordingly, a five-year program of parking lot construction was begun by the city in 1947. Complete plans call for 16 lots to provide 4,000 parking spaces, financed on a "pay-as-you-go" basis with proceeds from parking meters.

Initially, the most pressing need for off-street parking existed in the Lincoln Road area. This contains a large shopping center, the scene of much business activity. Parking lot construction to serve this area was begun late in 1945. Originally only one lane of parking was provided, parking was unrestricted, and no meters were used.

This small parking area was placed in operation in March 1946. Immediately businesses within the area reported favorable effects of the lot on business activity. The continued demand for parking soon necessitated additional facilities. At the end of one year's operation, two more lanes were added to the Lincoln Road lot, making a total of six lanes of parking stalls. To regulate time-limit, parking meters were installed as the most desirable means of assisting the police. Meters were purchased for cash; the time-payment plan which permits meter revenue to pay for the meter was not employed.

Store owners on Lincoln Road soon realized the value of off-street parking facilities in the rear of their establishments. Many of them opened attractive rear entrances; others constructed show windows. The continued favorable effect of convenient parking upon business activity prompted merchants again to request further expansion. In 1948, another section was added to the lot, bringing it up to its present capacity of 962 cars.

Layout of Lot

In designing the lot careful consideration was given to appearance. All parking is at a 45° angle, and 20 foot drives provide two-way movement throughout the lot. The center islands are 6 feet wide and contain two rows of parking meters for vehicles parked on either side of the island. Areas for planting trees have eliminated the barren expanse generally associated with a parking space of this size. A green strip on each side of the lot further tends to beautify the layout and blend it with the surroundings.

Parking stalls, 8 feet 4 inches wide, are generous in size when compared to many commercial parking lots with stalls 7–½ feet wide; the common practice is 8 feet.

All parking is done by the driver. The lot has no attendants and offers no automotive services.

Parking Time Limits

Time limits for parking have been carefully established. As a general rule a parker is willing to walk a greater distance for longer parking

time. On the other hand the average parker also wishes to pay less when he parks for an extended period. Both these general rules have influenced the time limits allotted to various sections of the Lincoln Road Parking Area.

One row of parking stalls is immediately behind a large number of stores; the rows farthest removed are 400 feet away. Thus a person using these spaces must walk the equivalent of a city block. In accordance with the rules mentioned above, the two lanes nearest the stores restrict parking to two hours with a fee of five cents per hour. The next five rows of stalls permit nine hours parking at a rate of five cents for each one and one-half hours. The meters are designed so that six nickels may be inserted for the total parking time of nine hours.

The remaining five rows of stalls farthest from the stores are posted to allow ten hour parking; the fee is five cents for each two hours. Again the total fee of twenty-five cents may be inserted in a meter to provide the full ten-hour parking time.

Enforcement of Time Limits

Time limits for parking make the facilities available to the maximum number of cars consistent with the parking requirements in the area. Meters are used only to aid the police in enforcing time regulations. This same principle applies to meters used at the curb or on city-owned parking lots.

One policeman is assigned to full-time duty of patrolling the Lincoln Road Parking Area. While it may seem a waste of manpower to assign a full-time man to one such facility, the job assumes additional value when the number of parking lot spaces is compared to equally available curb space. The 962 spaces in the Lincoln Road parking area would occupy 19,240 feet of curb, assuming parallel parking with stalls twenty feet long. With no curb space used for other purposes in blocks 400 feet long, 962 parking stalls would occupy the curb on all four sides of twelve city blocks.

Actually, about one-third of the curb space in cities is devoted to loading zones, fire hydrant zones, driveways, hotel and theater entrances and other uses which make it unavailable for curb parking.

It would require therefore about *sixteen* city blocks to accommodate at the curb the cars that can be parked in the Lincoln Road area. One policeman cannot be expected to regulate parking in an area larger than this.

The Lincoln Road parking lot officer, mounted on a three-wheel motorcycle, checks cars for obedience to time limits exactly as he would if they were parked at the curb. Besides observing that the proper fee has been metered, the policeman notes the length of time each vehicle stays in the two-hour parking area. The purpose of the two-hour limit would be defeated if parkers were allowed to "feed the meter" by inserting additional coins upon the expiration of the allotted time.

Experience indicates that the number of parkers who overstay time limits or fail to insert coins in the meter is about the same at the curb and in the lots.

Special Permit for Professional Men

Doctors, lawyers, and other professional men are extended the privilege of using the Lincoln Road and other city-owned parking lots without operating the meters. A permit is given to use any city-owned lot. The monthly fee for such a permit is six dollars during the tourist season, and three dollars at other times. This permit does *not* allow unrestricted use of curb parking space, but is confined to space provided in lots. The use of the permit is rather general among professional men. During the 1947–1948 season, income from permits amounted to $5,400.

Other Parking Areas

Three other lots are now in operation. Two were constructed on land owned by the city. The total assessment on the two parcels at the time of construction was $1,350,000. The Collins Park Area built on land assessed at $850,000 contains spaces for 168 cars. Its parking meters permit nine hour parking for 6 nickels—or one and one-half hours for five cents. The Surfside Park area on land assessed at $500,000 contains 323 parking spaces. It also provides nine hour

parking for thirty cents; or any portion of that time at the rate of ninety minutes for five cents.

The fourth lot, the Lenox-Michigan Parking area, was purchased by the city for $33,000 to provide parking for 76 cars, a cost of $434 per car space. Another $9,281 to surface and improve the area brought the total expenditure to $556 per car space. Again, a nine hour limit is imposed with the meter fee at five cents per ninety minutes.

Financing the Program

Miami Beach has used curb parking meters since 1938. In order to initiate the parking lot program, two steps were necessary:

1. Authorize a bond issue of $300,000 to acquire land parcels.
2. Place all parking meter revenues into a fund to be used to pay off meter costs, construction, landscaping and operational expenses.

Considerable opposition to this program developed from merchants. Under the skillful guidance of the city manager, however, the merchants soon realized that their own business prosperity depended upon immediately increasing available parking space. After a strenuous educational campaign by the city, a $300,000 bond issue was approved by freeholders in 1946. Prior to this time, the first portion of the Lincoln Road parking area had been opened. Plans were immediately developed for expanding the lot, and $20,000 was ultimately expended from the bond issue. *This represents the only expenditure from the bond issue; the city has left $280,000 of the original $300,000.*

Parking meter income has provided funds for all subsequent development. Assuming that income from curb meters will be sufficient to defray the cost of all meters, it is interesting to develop an amortization plan for the cost of improving the off-street lots.

Table I shows the cost of constructing and landscaping the four lots now in operation. Total construction cost $218,971, of which more than half was expended on the Lincoln Road parking area. Landscaping cost $38,000, approximately evenly distributed between three lots. The Lenox-Michigan lot records no landscaping expense since it consists of but two rows of parking stalls with one roadway serving them.

Improvement costs vary widely when considered in terms of the number of car spaces provided. As would be expected, the Lenox-Michigan lot with no landscaping cost averaged only $122 per car space for improvements. The Lincoln Road area cost $155 per car space for construction and landscaping; $160 per car space was expended for the same purposes at the Surfside parking area.

Table 1

CONSTRUCTION AND IMPROVEMENT COSTS
MIAMI BEACH PARKING LOTS

Lot	*Construction Costs*	*Landscaping Costs*	*Total Costs*
Lincoln Lane	$135,128	$14,430	$149,558
Collins Park	34,359	12,583	46,942
Surfside Park	40,203	11,706	51,909
Lenox-Michigan	9,281	———	9,281
	$218,971	$38,719	$257,690

However, the Collins Park area improvement amounted to $285 per car space, largely because of landscaping done on this lot. This item amounted to about one-fourth of the total improvement costs.

In amortizing these improvement costs, the seasonal fluctuations in parking demand must be remembered. The tourist season normally lasts about five months. January, 1949 has been taken as an average month during the tourist season, and parking meter income for the four lots is shown in Table I. Total parking meter income for the month was $5,462, which represents an average monthly income of $3.57 per meter. This varied between lots from as little as 69 cents per meter per month to a high of $7.51 per meter.

It is interesting to compare the income of meters in lots with meters at the curb. During the month of January, 1949 when the average income for lot meters was $3.57, meters at the curb returned an average revenue of $3.88. With parking rates generally lower in lots than at the curb, it is evident that parking lot spaces are receiving approximately the same amount of use as curb parking spaces.

The time required to amortize improvement costs varies from 23 months to 127 months; the average for the group of four lots is 47 months. With only five revenue-producing months in each year, the

entire improvement cost can be amortized in nine and one-half years. Although it is impossible to apportion certain costs because of overlapping between parking lots and curb parking areas, city officials estimate that the entire program, including cost of meters, operating expenses, and improvements can be amortized in twelve years.

Future Plans

In addition to the four parking areas discussed in this report, two lots are currently being developed to care for approximately 600 cars in an area which has developed into a small shopping center. One of its problems has been the hazard and congestion created by angle parking at the curb in front of the stores. Plans provide for careful timing in the removal of the hazard by changing from angle to

Table 2

METER INCOME AND AMORTIZATION OF IMPROVEMENT COST
MIAMI BEACH PARKING LOTS

Lot	*Improvement Costs*	*Typical Monthly Income (Seasonal)*	*Monthly Income Per Car Space*	*Months Needed to Amortize Costs*	*Years to Amortize (Based on 5 months/ year)*
Lincoln Lane	$149,558	$3,905	$4.06	38	7 ½
Collins Park	46,942	1,262	7.51	37	7 ½
Surfside Park	51,909	222	0.69	23	4 ½
Lenox-Michigan	9,281	73	0.96	127	25 ½
Total	$257,690	$5,462	$3.57	47	9 ½

parallel parking. This change will accompany the opening of new off-street facilities in the area, in order to offset the inevitable cry of "lost parking spaces" and direct attention to the great number of additional spaces available.

Thus the businessman is made to see his two-fold benefits from the changes; decreased traffic congestion on the streets and increased parking facilities for customers' cars. The advantages of the new system soon overcome the loss of a few curb spaces. Many sound traffic programs have lacked public support because public officials failed

to coordinate and time traffic changes so as to obtain maximum advantage of *immediate* reaction to such changes.

Plans are now under way to seek legislative authority to issue $4,000,000 in revenue bonds to complete the overall parking system. This deviates from the original "pay-as-you-go" plan and resulted from the intensive use of existing areas. Current estimates are that the entire program could be amortized in twelve years.

Another serious consideration is the availability of land. Miami Beach has 350 hotels and 22,000 apartment units crowded into its 4,000 acres; and the number of buildings is increasing steadily. Each new building has a two-fold effect on the parking program: the amount of available land decreases, and logically, the price of land increases. City officials believe therefore that time is of the essence and plans are being developed accordingly. With the success of the initial program as a basis, the new developments will continue to keep Miami Beach a leader in the field of municipal parking facilities. Certainly the tourist visiting the "World's Playground" will be grateful to city officials for their far-sighted approach to the parking problem. Few things are more exasperating than to be within sight of the Atlantic Ocean and not be able to enjoy it for lack of parking space. If city officials get the "green light" on their program parking will be one worry lifted from the shoulders of the tourist vacationing at Miami Beach.

Elements of Selective Enforcement in Traffic Regulation

CHIEF JOHN M. GLEASON

Chief John Martin Gleason has been Chief of Police at Greenwich, Conn. since 1941. He came to Greenwich in 1917 and entered the field of law enforcement in 1930 as a patrolman. In 1937, he was promoted to the rank of Lieutenant and placed in charge of the newly formed Traffic Division of the Greenwich Police Department. On January 1, 1940 he was promoted to the rank of Captain, and in the following year after competitive examination, was appointed Chief. In 1944 Chief Gleason attended the National Police Academy of the FBI in Washington, D. C. and was graduated with honors. He has since served as a member of the faculty of the National Academy. In 1945 he was elected President of the Connecticut Chiefs of Police Association and appointed a member of the Police Committee of the National Safety Council. In 1946, he was elected Fifth Vice-President of the International Association of Chiefs of Police and President of the Association on September 15, 1949. He is Chairman of the State and Local Officials' National Highway Safety Committee of the President's Highway Safety Conference and a member of the National Committee on Uniform Traffic Laws and Ordinances.

A YEAR and a half ago, the Traffic Division of the International Association of Chiefs of Police, directed by Franklin M. Kreml, undertook the job of reorganizing Chicago's traffic control machinery. That city's motorists had killed 505 persons the year before and Mayor Martin Kennelly wanted the slaughter stopped. Just after last New Year's day, the *Chicago Tribune* carried a story with this headline: "Traffic Heavier in '49, but Toll Declines 17.2%." The story read as follows:

"Traffic deaths in Chicago dropped 17.2 per cent in 1949 altho nearly 70,000 more Chicago-licensed cars used the city's streets than

in 1948, Capt. Michael J. Ahern, police traffic chief, disclosed yesterday in his annual report.

"Automobile fatalities in the city proper in 1949 totaled 396, as against 478 in 1948.

"The reduction was attributed in part to stricter police enforcement of traffic regulations. As a sample of police work, Capt. Ahern noted that during the final week of 1949, his men issued 8,632 tickets for violations of traffic laws. Parking violations made up 3,354. In the moving vehicle classification, 944 tickets were given for speeding . . ."

A Victory for Enforcement

As I read the story I was impressed again with the importance of police traffic-law enforcement. It proved that whenever a city makes up its mind to do something about its traffic problem, success is possible.

We, in Greenwich, Connecticut, by the practical application of selective enforcement and penalty-paid-convictions, have reduced our traffic fatalities from a ten-year average of 17 a year to an average in the past five years of 4.5 a year.

We cannot say the problem is beaten. Enforcement is a never-ending program that must be continuous to maintain a minimum accident-experience.

I'm certain that Chicago, like hundreds of other cities, has a long way to go before it can say the problem is licked. But officials of that city are on the way. They have proved again that safe and efficient highways cannot function without good police control. My hat is off to Commissioner Prendergast, Captain Ahern and to all the Chicago police officers. I hope they continue their excellent work, and that the citizens of that city give them the support they need in the years ahead.

Not long after reading the Tribune story I was in Washington where I met Mr. Kreml. I asked him about the work in Chicago. He agreed that the city has an excellent start, but that much remains to be done. He pointed out that the reduction made during the first year of operation was almost entirely accomplished by the work of

the police themselves. The city had made no substantial improvements in either its traffic engineering or safety education programs. In other words, enforcement by the police, coupled with the work of traffic courts, has been responsible for the job done this far.

Every police administrator, as well as every official having responsibility for traffic control, should understand the basic principles of selective enforcement. At present, many cities are using this technique to good advantage. Unfortunately, many others have the wrong concept of it.

Here are things to be done before selective enforcement can bring results comparable to those obtained in Chicago. But first, look at the record of other cities that have applied this administrative device. In Detroit for the twelve years prior to 1937, traffic deaths had averaged more than 300 annually. Three-hundred-and-fifty-seven died in 1936 and 335 in 1937. The city greatly increased both the quantity and quality of enforcement in 1937 and the following year, when the full impact of the new program was felt, deaths dropped to 196. Since then they have been held down by intelligent enforcement and coordinated and continuing programs of safety education and traffic engineering.

Los Angeles, with a fantastically high vehicle-registration, increased its enforcement and educational efforts in 1946. The 1948 death toll for the city showed a 41.7 per cent reduction from 1946.

We know from the experience of these cities, as well as many others with membership in the International Association of Chiefs of Police, that traffic accidents are reduced whenever an intelligent program of enforcement is applied. We know that traffic engineering and safety education, the other two E's of traffic safety, are highly important. But they are not enough. We still must have enforcement, the welding tool of all traffic control.

There are practical reasons for this. Although engineering will bring improvements and should be utilized as soon as possible in every city where needed, the expense and time required for construction makes it necessary for the city to employ additional enforcement as a stopgap. Traffic education must also depend upon enforcement because immediate gains by this method are not possible.

Enforcement Defined

The police department's job of traffic supervision is divided into three basic parts. These are so closely related that failure in one necessarily weakens the other two. Here's how they were defined by the Enforcement Committee of the President's Highway Safety Conference:

Directing Traffic means:

(a) Answer questions, especially about local traffic rules and how to reach places or routes. (b) Indicate to drivers and pedestrians what to do and what not to do, especially when and how to move at a congested point wherever and whenever hazards and congestion make the use of streets and highways dangerous or difficult. (c) Make emergency rules for the flow of traffic when the usual regulations prove inadequate or when special regulations have not been made to meet unusual or unexpected traffic conditions.

Investigating Accidents means:

(a) Take action needed to keep accidents from becoming worse after they have happened. It includes giving first aid, protecting the scene to avoid additional pile-ups, preventing fires, theft and other such activity. (b) Find out what happened. (c) Decide why the accident happened. (d) Record and report the facts and conclusions.

Traffic Enforcement means:

(a) Detect, in connection with street or highway use, pertinent defects in individual behavior, vehicle equipment or roadway condition. (b) Start appropriate action at once to (1) prevent such defects from causing accidents or delays, (2) remedy the defects and (3) discourage their repetition. (c) Record all such activity. (d) Help in the trial and punishment of traffic law violators by cooperating with prosecutors, testifying and serving warrants.

Of the three basic parts of the traffic supervisory job, or responsibilities, traffic enforcement is the one that keeps accidents down. It is an accident-prevention measure and the administrator and all

personnel engaged in this function should have that fact clearly in mind.

The chief of police should also understand that this function, or job, is not possible unless (1) he has a good accident investigation system and a method of recording and making intelligent use of the information thus provided; (2) enforcement is applied selectively, and (3) there is proper, certain penalization of violators in the traffic courts.

If these three things are done properly a deterrent is established. Actually, by enforcement we mean to compel obedience. In cities which have reduced their traffic toll, enforcement is such that the arrest and punishment for misbehavior are something a citizen must continually reckon with when walking or driving on the public ways. He drives carefully because he knows something is going to happen to him if he's caught.

Selectivity Not New

Selective enforcement is not a new principle. It has been used by police in criminal work for hundreds of years. When applied to traffic control it means simply that enforcement is directed in accordance with needs as indicated by study of traffic accident records.

Experience has shown that enforcement of law owes its effectiveness to the simple fact that whenever a substantial group of society engages in practices detrimental to the general welfare, because of either carelessness or selfish motives, society must, through law enforcement, create a sufficiently strong deterrent to such conduct. It is obvious that enforcement will serve to create such a deterrent only when there is an adequate amount of it, of sufficiently high quality, to induce more widespread law observance.

Because there was such tremendous increase in motor vehicle use during the last twenty years, police departments found they could not cope with the problem by themselves. Now, fortunately there is an increasing trend toward cooperative effort with other agencies sharing in this responsibility.

Since we did not have enough personnel or equipment to patrol the thousands of miles of city streets, or control the thousands of

vehicles using them, it became necessary to develop an administrative device which would assure maximum utility of police personnel. In other words, we had to put the officers in the locations of the greatest number of accidents. We had to assign them during the hours of the greatest number of accidents. We had to instruct them to look for the violations causing the greatest number of accidents. This procedure became known as selective enforcement. When used properly, as illustrated by the experience in Chicago, Detroit, Los Angeles and other cities, results are immediate and dramatic.

Selective enforcement is efficient because it uses man-power best by putting it to work when, where, and on violations most needing attention. It gets results more quickly by striking at the "sore spots." It secures public support more easily than poorly planned enforcement because arrests are made at the times and places, and for the violations, which accident records show to be most hazardous.

But it can't succeed without a good program of accident investigation and accident reporting. The administrator won't know where to make his assignments, or when, nor can proper attention be given to accident-causing violations, unless records are maintained and properly analyzed. And no matter how many violators are arrested, the work is useless unless the traffic courts complete the deterrent action by intelligent penalization of such violators.

WHY ENFORCEMENT FAILS

I've often had police chiefs come to me and complain that they weren't getting reductions. They blamed the city government, pointing out how requests for additional men had been repeatedly ignored. They were convinced that nothing could be done until more personnel and equipment were made available. But usually, their control operations were impotent because they were failing as administrators.

A police chief who knows enforcement can immediately detect the reasons why chiefs of this type fail to get results. About all you have to ask him is how he makes his assignments. One chief told me not long ago that he had been given forty additional men. He was

worried because the city had shown no reduction in accidents. They had actually increased.

After questioning him I found that he (1) had failed to give the new men proper training, (2) was not concerned with accident investigations because he felt that it was "like locking the barn after the horse was stolen," (3) failed to make analysis of accident reports that did come in, (4) failed to concern himself with how his men were assigned, and (5) was feuding with the two traffic judges of the city because they complained about the work of his officers while in court. It didn't take long to understand why his department was having a tough time, or why his mayor was wanting to know what was wrong.

Many other departments have an adequate number of men, but fail to get them into action. The most common fault is loss of manpower through special assignments. Another one previously mentioned, is failure of the courts to follow through with a penalty that completes the deterrent action inaugurated by the arresting officer.

Experience has shown that when courts and police are working effectively, well over 90 per cent of the arrests should result in fines or imprisonment.

Other reasons why the enforcement machinery may be inefficient are:

1. Influence on the officer at the time of violation.
2. Political pressure subsequently brought to bear on the mayor or chief of police to tear up the ticket, or a similar fix obtained through traffic-bureau administrative personnel.
3. The "fix" through a judge or traffic court personnel, or quashing of the case by the prosecutor.
4. Neglect of follow-up with violators who fail to appear. In some places this amounts to half of the tickets issued.
5. Dismissal of cases as a result of officer error.
6. Lack of Police Training on gathering evidence.
7. Lack of court understanding of the enforcement objectives.
8. Bad traffic laws and ordinances.

The police administrator can correct many of these faults. Others will require cooperation of the courts and law makers.

Selective Enforcement Planning

Departments wishing to improve their traffic control must lay out motorized traffic patrol assignments solely on the basis of a selective enforcement plan. Here is the formal definition of selective enforcement as set forth in the report of the Enforcement Committee of the President's Highway Safety Conference:

"Selective enforcement is enforcement which is proportional to traffic accidents with respect to time, place and type of violation. Selectivity of enforcement is the degree to which it is proportional to accidents in these respects."

The job of establishing a selective enforcement program is simply one of making decisions. It is a job the administrator must and should do. Here are the basic things, on which decisions are based:

First, the administrator must provide for the statistical processing of basic accident data from time to time. The resulting summary should give the number of accidents by hours of the week for a period of sufficient length to provide at least one accident reported for each of the 168 hours of the week. In smaller communities the experience studied may have to extend over a period of more than a year. In larger cities six to eight months, or even shorter periods, are adequate.

The administrator must also have his statistical personnel prepare for him a spot map of the entire city showing accident location. The experience used here should extend back at least a year for larger cities, and in smaller cities for the same period required to obtain the hourly distribution data as described above. This spot-map should show by colored pins the principal types of violations involved in the accidents studied. The following is a typical listing:

Black — Speed
Red — Signs and Signals
Green — Turning
Blue — Overtaking
Brown — Following too Close
Orange — Drunk Driving
Yellow — Other
Purple — Pedestrian

After this basic information has been provided, the task of providing selective enforcement for a city becomes one of administrative decision. If you are the administrator the first thing you have to do is:

1. Figure out how many patrol units you have available; that is, how many men you can put on the street. You must hold back from this count enough men to provide for time loss due to vacations, sick leave, and the minimum number of special details, or assignments.

2. Next, you must decide on how far you can go toward establishing one-man patrol units. This must be decided on the basis of the policing problem in your city. Where possible, one-man patrols are more efficient, but other factors, such as the crime situation and dangers involved, must be considered.

3. Your next job is to determine policies. In other words, how far you can go toward adjusting the working hours of the available personnel to meet the demands of traffic as revealed by the study of accident experience. It is not necessary to employ split shifts in accomplishing this reassignment, but you will undoubtedly have a greater number of men on duty at different times.

After you have determined how many men you have, how they are going to work, and how far you can go in changing working hours, you must decide how to assign the men you have so that the number on duty each hour will be approximately proportional to the number of accidents which occur in that hour. This is *selective assignment by time*. As administrator, all you are involved with is the task, which is not usually too complex, of puzzling out the hours of duty of your men, their days off, and so forth, and putting this schedule into effect. After you have struggled with the problem for a while you will be able to determine whether or not you have enough men and enough equipment to meet the maximum demand, which is usually on a Saturday. If you don't have enough men you must adjust your schedule as best you can and initiate action to obtain additional personnel and equipment.

Chiefs have told me their department was so small it was impossible to use selective assignment. That is not true. Selectivity of assignment can be followed in departments which have but one or two officers.

The administrator's next problem is: Where are these men going to work? Where will I assign them? You have them reporting for work at various times of day, perhaps ten or fifteen at a time. Go to the spot-map and divide it into areas in which there are roughly the same number of accidents. (Some of these areas may be a section of a main thoroughfare and thus require line patrol.) Assign units to these areas as equitably as possible. If you have but a limited number of men the areas will of necessity be larger than if you are working a big force.

Next, the units, working with their supervising sergeant or with you as administrator, should determine just what streets of their assigned areas need most attention. You will find that these are usually the main streets, although patrol is by no means restricted to them. This procedure is *known as selective place assignment.*

The next decision you must make is what violations need the most attention. Certainly, if speeding is causing the most accidents you won't want your men making easy arrests for double parking, or for sliding through stop signs. You must again go to the spot map and examine each area. Find out from the colored pins what violations are most predominant. Many departments allow the sergeant and the men themselves to study the situation and determine what faulty driver action is causing the greatest number of accidents. Others handle the problem entirely through the analytical unit which issues special enforcement bulletins to the men on the street. These alert them to the violation most prevalent in their areas of patrol. This whole process is known as *selectivity by violation.*

Finally, the proof of the selectivity you are using is obtained by comparison by hour of the day and by the spot map, of arrests with accidents. This job is of course statistical in nature.

The *Enforcement Index* is also used by many departments to measure their enforcement efforts. It is a rough measure of enforcement which is valuable only when restricted to use within one department. This is a rate—in a community for a period of time—of the number of convictions with penalty for hazardous violations per accident involving death or injury.

This rate is found by dividing the convictions with penalty by the accidents. Suppose your city, during a year, has 2,400 fines and jail sentences for hazardous traffic violations and 200 traffic accidents

in which people are killed or injured. Divide the penalties by the accidents and you have the index: 2,400 ÷ 200 = 12 convictions per accident.

The amount of enforcement necessary to control accidents in any area cannot be foretold. In some cities an index of 10 is enough, but many cities have found that they must have an index of 30 or 40 before results are obtained. The amount you will need can be found experimentally by gradually raising the enforcement index until the accident experience has been definitely reduced. The enforcement effort should then be maintained for a time at that level. It is best to use the least enforcement possible to obtain desired control. A higher index is needed initially to bring accidents under control than to keep them under control during later months.

As pointed out by the Enforcement Report, this index is only a rough administrative tool. It will help you in measuring past enforcement effort, in planning future operations and in comparing past and present operations. It is mainly a measure of the quantity of enforcement, but does reflect some of the efficiency of the enforcement because it considers convictions rather than arrests.

The elements of enforcement which have been discussed here briefly are by no means complete. They represent the basic requirements for a successful program. Accident records clearly indicate that unsafe driving practices prohibited by law are a leading cause of accidents. And the records of numerous cities, including Chicago, indicate that good enforcement is a quickly effective, powerful deterrent to these violations, with a consequent substantial accident reduction. No city has achieved substantial control of its traffic problem without a good program of enforcement, nor has such a program ever failed to produce the desired results, when accompanied, of course, by equally sound engineering and education.

A Traffic Administration Plan Series
Part Two: Professional Aids

WILBUR S. SMITH
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THE NEED for dynamic leadership in local traffic programs was discussed in a previous article. It is almost impossible for an effective organization to be developed and for an adequate program to be planned without strong leadership. On the same basis, some elements of the traffic program for a typical community should be considered in the light of professional services.

Traffic Demands on Government Agencies

Cities today face many problems and trends which are difficult to guide or control. Traffic, high on the list, affects many officials and bureaus. There are few agencies of city government that do not have an interest in street traffic affairs. Many have direct relationships. As traffic activities developed, they were fitted conveniently into an already established unit of the government. Traffic cuts across many established lines and has become a part of many departments. Similar functions have been grouped together in a logical manner. This type of growth cannot be criticized; it is a common pattern in government.

Recent studies in one city revealed 13 official agencies concerned with traffic. It is not expected that in the average city many agencies should give traffic affairs their major and best attention. Some have them fixed by law, in others the traffic functions are merely implied, and in a few, traffic is dealt with only as a "moral" obligation. Most of the agencies deal with traffic matters to no greater extent than with many other functions and responsibilities of city government.

Divided responsibilities and varied interests raise difficult questions in administrative organization and procedure. A cohesive program should embody all component traffic activities. In the average city, it is always necessary that traffic be given competent atten-

tion by the engineering or public works department, the police, the planning board, the legal and judicial agencies, and the electrical bureau. Acceptable results cannot be expected unless these agencies make traffic considerations an important part of their over-all duties.

It has been well demonstrated that superficial analysis will not adequately and effectively cope with traffic problems. The public and public officials must recognize this and make provisions which will enable detailed analyses and expert approaches of a sound character. Without such approaches, piecemeal treatments develop and too many cases crop up of one group placing the responsibility for failure on another.

It is not advocated that all traffic functions of a city be disengaged from their present governmental units and placed in a new and separate traffic unit. In some cases various components would not blend with each other as well as they blend within the agencies where created. It is important that all agencies be made to function smoothly together. Ways of coordinating local traffic functions will be discussed in a subsequent article.

Professional Services

When the automobile was new, traffic was not a serious problem. While there were heavy concentrations of horse-drawn vehicles and transit cars in urban centers, the demands imposed on city authorities were light in relation to those now created by the automobile. Motor travel today creates problems challenging the best abilities available. Present traffic conditions augmented by rapidly increasing registrations present problems which appear hopeless of solution.

Expert knowledge is needed to effect traffic solutions within the economic realm of immediate accomplishment in most areas. It is apparent that the best solutions can no longer be expected from lay opinions. To avoid inefficient and inadequate remedial measures, cities need technical assistance.

Trends in modern municipal government offer many parallels to the development of professionals in traffic staffs. The swing toward city management is an indication that city government is so complex as to require the services of managers specially trained and experi-

enced in the over-all business of city administration. It places municipal activities on a professional level and provides benefit of technical experience. Public health, education, social welfare and other major branches are turning toward technical developments which lead to a high degree of specialization and professionalism. The mayor of one large city, in making policies and taking action, considers it advantageous to use the reports of a psychiatrist. He finds that psychological reasoning is valuable in the accomplishment of many major objectives and the psychiatric specialist has become an important member of his advisory staff. Development of such professional service in government should not be overlooked. All major branches of traffic should follow a similar trend in specialization. It is no longer a question of being able to afford these services, but rather one of not being able to do without them! The use of professional traffic advice is often a "stitch in time" proposition.

Significant developments are taking place in all important traffic fields. Actions and experiences of many national groups support those of local governments in advocating professional service in the administration of civic affairs.

Aids Needed In Basic Traffic Functions

For many years the minimum functional traffic requirements have been classed under the "three E's"—enforcement, engineering, and education. The balanced, comprehensive traffic program will contain these three components backed by legislative action, public support and the courts. Required finances must be provided. The basic functions and components can be put together under a variety of organization forms. It is not yet possible to prescribe a single form as ideal; it obviously varies with local conditions. It is encouraging to note that a uniform pattern seems more likely of achievement now than several years ago. This is because of valuable experience gained and widespread adoption of uniform traffic laws and ordinances.

So much has been learned concerning basic traffic activities that they are now generally recognized as an essential consideration in city, county, and state government. There are wide interpretations

as to what constitutes a "proper" and "adequate" provision. Many local needs and problems must be considered in evaluating the basic governmental traffic functions of a particular community.

The police cannot escape a major responsibility for traffic operations and improvements, if laws are to be enforced and the safety and welfare of the public are to be maintained. The police executive must decide what constitutes a satisfactory balance between traffic and other enforcement responsibilities. Often it is not an easy matter to properly apportion personnel, equipment and budgets. The problem becomes especially difficult where manpower and funds for enforcement work are totally inadequate, and this appears to be a common situation. Traffic enforcement activities have many peculiarities not common to other phases of police work, and properly require specialized attention.

Many aspects of traffic control cannot be handled by age-old criminal techniques: every citizen is a part of the traffic problem; restrictions must be tempered with "aids" to movement; preventives vie with prosecutions; and perplexing cases peculiar to motor vehicle accidents develop. To meet these and other traffic enforcement problems effectively, police require qualified men, men who through training and experience have become especially capable in traffic. Results produced by the creation of traffic divisions and special accident investigation units attest to the need for such assistance.

Most cities provide full-time personnel for basic engineering operations. Small cities usually provide for engineering services on a sustained basis through the use of part-time or consulting engineers. Engineering qualifications are required for street maintenance, drainage, water supply, sewage disposal and other public welfare activities. Sometimes the basic engineering organization can also provide the necessary traffic engineering services. As a rule, this is not the case. The engineering and public works units are apt to give insufficient attention to traffic unless they have assigned to them personnel especially qualified in traffic matters. However, whether or not the engineering division has within it a traffic engineering unit, it becomes an important arm of the over-all urban traffic organization in that it must direct the construction and maintenance of public thoroughfares.

Traffic engineering is the definite outgrowth of the demands of the average citizen for expert handling of traffic matters. Since 1924, when traffic engineering first came into being in Seattle and Pittsburgh, a widespread recognition of a need for this specialized type of service has developed. There are now about 75 cities with traffic engineering units. It is generally believed that cities of 50,000 or more population can advantageously use the full-time services of a traffic engineer. Where a city of this size, or smaller, cannot afford the full-time services of a traffic engineer, it is recommended that they seek traffic engineering assistance from state agencies or consultants. Under some geographical conditions it is feasible for two or more cities to jointly employ traffic engineering services.

The work of traffic engineers has extended to many business fields, such as insurance, auto fleets, finance, planning and architecture.

In considering engineering aspects of the municipal traffic problem, services of planning engineers should not be overlooked. There are few phases of planning work which are not closely associated with automotive transportation. Obviously these engineering activities embrace not only basic highway engineering functions, but also traffic planning and operation.

Public educational activities relating to traffic are numerous. Almost every phase of the public educational machinery has some relationship to personal and public safety and thereby at least an indirect relation to traffic.

Several facets of traffic educational activities seem quite important. What is the proper relationship between personal and public responsibility in traffic education? It is conceivable that the increased relationship of individuals to traffic activities make education therein more a matter of personal than public responsibility. There is a limit to which such personal needs can be supplied in the public educational machinery. It is a well-known fact that it will always be impossible to include in public education all the subjects desirable for a normal and well-balanced existence. If the educational processes cover, as they certainly should, fundamentals which can be applied in traffic as well as in many other spheres of life, then it would seem that the job had been accomplished. It is also important

that the limitations of education must be recognized in connection with the over-all demands imposed by driving and traffic problems. It has been known for many years that telling people what is right and what they should do in no way assures compliance. Education alone cannot develop the "perfect" driver, or clear the obstacles to a quick and satisfactory solution of our traffic problems.

Whether traffic and safety training is given in the schools, or whether it is directed to the public at large by other means, those in charge should be especially qualified. Trying to educate people in proper driving techniques, in general traffic operations, and in safe driving and walking practices, without first qualifying the educators is apt to produce warped viewpoints and improper practices. Any training based largely on viewpoints of the individual instructor, or the policies of a particular group, is apt to produce undesirable results and only add to present confusion. In traffic this is particularly true because of the many self-styled experts and numerous factions. Consider a few of the common viewpoints; "speed causes all accidents;" "educate 'em? lock 'em up!"—"the traffic problem can never be solved until we put new heads on all drivers;" "trucks are the most damnable of all traffic components." Such viewpoints reflect the biases that can enter into this type of education. Courtesy, good judgment and legal obedience are common to many fields of education but technical instruction requires a background of proper technical preparation.

On the subject of education, there is at least one other important distinction which should be drawn: propaganda and ballyhoo have no place in the traffic safety field and should never be associated with sincere educational programs.

Establishment of separate traffic courts and the training of traffic judges and prosecutors demonstrate the need for traffic specialists in these fields. It is apparent that the job cannot be done without specially qualified personnel. Proposing these requirements in no way reflects on existing personnel or activity. Some progress in this direction indicates recognition of the new and growing magnitude and complexity of the traffic problem with which public officials are charged.

In pointing to the needs for technical and professional services,

there is no intent to imply that elaborate and expensive positions or bureaus must be created. Actually, most cities can obtain adequate services without appreciable increase in expenses. Often major improvements can be effected with the professional help of state agencies. Sometimes a basic study or survey is the principal need to indicate essential activities and get the program under way. Sometimes the correctives are so apparent that a minimum of additional administrative and financial support is all that is needed. Sometimes existing personnel, if given the opportunity, can provide the necessary technical guidance. Conditions are different in every city, but "full dress" services are not in every instance essential to meet the requirements for professional traffic services. Some cities may claim otherwise but they are available to a degree that most cities can afford.

Official and Administrative Support

The acquirement of professional traffic service is often blocked by city officials who are not fully acquainted with the work to be done and the accomplishments to be expected. A mayor recently stated that he would recommend a traffic engineer without hesitancy if he felt it would solve the city's traffic problem. He continued to explain that it did not require an expert to analyze the city's most serious problem and see that traffic conditions could be helped only by extremely expensive and drastic physical improvements. Obviously the mayor did not realize that professional technical service, though it could not produce a "magic wand," could result in making the most of existing facilities, and in planning new ones. Certainly such logical procedure would be free of an accusation of frustration.

The mere creation of a traffic position or bureau does not mean that the city's responsibilities are met. If improvements are to follow, it is necessary to have professional advice recognized and supported by key administrators and elected officials. All too often a mayor will point to the office of traffic engineering, or to the traffic division of the police department or to safety educational efforts as indicative of an "excellent" traffic program when actually these units are so strapped by regulations, budgets, interference, and other conditions that they are able to demonstrate only a fraction of their potential

ability. Unless the "traffic people" are given a favorable atmosphere in which to work, they cannot expect to accomplish much. With the best support and official backing, the task of the traffic professional is difficult. That is the nature of his problems.

Narrow and inaccurate viewpoints on the part of key officials regarding common traffic difficulties should be carefully watched. It is generally known that broad administrative guidance should be given the traffic program and the responsibilities of those executing them should be periodically re-appraised. It is a well known principle that weak public administrators will not be sufficiently bolstered by surrounding themselves with strong assistants.

Avoid Over-specialization

Throughout this discussion, professional and technical developments have been advocated which suggest a degree of specialization. A city or city department will naturally "build" into a program employing professional talents, but it is possible for some functions to become so specialized as to become unbalanced. There is no intention in this discussion to over emphasize specialization.

One way to avoid too much specialization is to consider separately the "staff" and "line" activities. In many areas, enough professional and technical guidance can be furnished at the staff level by providing executives with qualified technical assistants. Attempting to carry specialization through, under some conditions, to line functions, can develop inefficient utilization of manpower and equipment. Misunderstandings and jealousies arise, and frequently adverse situations develop which offset the advantages of technical specialists. It appears that in many activities much of the specialized attention can be given at the staff level, thereby making it possible to have line personnel deal equally with traffic and other responsibilities.

It is believed that in most cities of less than 100,000 population the necessary specialization can be confined to staff levels of engineering, enforcement and education. It is presumed, of course, that through staff provisions, necessary attention and assistance to traffic details will be forthcoming from all personnel.

With a qualified staff, the necessary training can be provided for all levels of personnel. Training becomes an important factor in determining the degree to which professional aid should permeate a department.

In conclusion, it is obvious that in the modern city all components of traffic work require professional assistance if proper services are to be provided. It is necessary to bring about divorcement of traffic from selfish and purely political objectives which prevail in some areas. Selfish and narrow ideas should not be allowed to block a sound program.